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XLV.

REPORT OF A CASE OF INFLUENZA, FOLLOWED
BY PNEUMONIA, LARYNGITIS, OTITIS MEDIA
SUPPURATIVA ACUTE, RIGHT SIDE; TON-
SILLITIS HYPERTROPHIC, CHRONIC
BILATERAL STREPTOCOCCUS TYPE.

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Major B., Construction Division, was admitted to the Walter Reed General Hospital October 8, 1918, with double pneumonia, following influenza. He was critically ill, but made a satisfactory recovery, so far as his pneumonia was concerned. During his convalescence it was noticed his voice became very husky, and he complained of pain in the region of the larynx, and pain referred to the ears. He was then transferred from the Medical Service to the Ear, Nose and Throat Section. On admission to this section his voice was raucous and there was some cough and pain the larynx. Examination showed both tonsils hypertrophied, with some exudate from the crypts on

pressure, smears showed positive streptococcus hemolyticus. The larynx was congested, the congestion extending well down into the trachea. There was a marked ulcerative condition noted along the free margin of the epiglottis, the free margin of the right vocal cord over the processus vocales of the left vocal cord, and near the apices of the arytenoid cartilages. The character of these ulcerations was unique in that the mucous membrane covering the cartilages was not actually broken through, but there was an undermining of the sub-mucous tissue leaving marked depressions with cup-shaped and everted margins. This was especially true along the margins of the epiglottis. Another interesting feature of these depressions in the mucous membrane was that they were dry, no secretion whatever being in evidence. The mucous membrane had a highly glistening appearance, which is quite unlike the usual forms of ulcerations met with in the larynx.

The figure shows a picture of the larynx, and Miss Stocking, the artist, has been most successful in bringing out the character of the ulcerations with their everted margins.

My first impression was that this patient was suffering from tuberculosis of the larynx, but upon further study concluded the ulcerations were of streptococcic origin. One point in favor of this view in making a differential diagnosis was the unbroken and dry membrane covering the depressions, whereas, if the case had been tubercular, the membrane would have been broken and bathed with secretion.

A few days after his admission to the Ear, Nose and Throat Section, an abscess developed in the left ear, smears taken from the secretion showed the streptococcus to be the prevailing organism.

X-ray findings of the lungs: All lobes are involved by this hemorrhagic pulmonitis and show a high degree of mottling. The picture is a true streptococcus type.

Laboratory findings: Tubercle bacilli after numerous examinations not found. Streptococcus hemolyticus, the prevailing organism, found in cultures from secretion from the tonsils and middle ear.

The tonsils, which may have been the primary source of the infection, were enucleated, with marked improvement in the patient's general and local condition.

After a month's furlough I saw this officer, and on examination of his larynx found the ulcerations completely healed, simply white cicatricial lines remaining. The abscess in the ear had healed and he had gained about twenty pounds in weight.

XLVI.

THE VALUE OF LABORATORY EXAMINATIONS IN
DIAGNOSIS AND PROGNOSIS IN OTOLARYNGOLOGY.*

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The vital importance of the relationship existing between the laboratory technician and the otolaryngologist is too well known to need emphasis or substantiation. This relationship well maintained means reliable, logical, scientific practice.

That the results of the laboratory may be trustworthy, it is necessary for the technician, in all but the simplest measures, to have had considerable careful training and a clear knowledge of the import of the examination made. This is becoming increasingly evident. It is no longer true that all men graduated since the colleges entered laboratory courses in the curriculum may become qualified laboratorians. There are those naturally fitted for this work as for any other human occupation.

The laboratory examination as an aid in otolaryngology is given much less attention than it deserves. The practitioner must be sufficiently conversant with the methods used to properly evaluate the technician's report, for in the end the

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successful man is the one who balances the pathologic return with the clinical findings and in the light of experience accepts or ignores it.

In the work of our office the laboratory has been a very great ally. We shall give the principal types of examinations made and discuss them in the light of our own experience.

Urine.—The urine examination is now considered almost necessarily a routine procedure. We are concerned here with albuminuria, glycosuria, acetonuria and the microscopic presence of erythrocytes, pus cells and casts.

It is important that the examination be routine and frequently repeated in some conditions, notably following tonsillitis and especially in its mild forms. Loeb has clearly pointed out this relationship. He was able to rule out scarlatina and diphtheria in four of the cases he presented—in fact, it is interesting to note that in the latter condition the nephritis arises concurrently with the acute disease, while it tends to follow the tonsillitis in the cases cited. In his papers he reviewed the findings of several workers and showed that the relationship has been recognized for some time. He referred to the work of Leyden in 1881, who drew attention to that form of so-called acute spontaneous nephritis following exposure to cold and wet, characterized by a slight fever, hematuria and albuminuria, in which cases he was able to secure a history of tonsillitis very frequently, and he thought it the most important antecedent condition. Morse considered tonsillitis a dangerous disease and advised routine heart and urine examinations following it. Loeb found that the urine changes come on insidiously with very mild albuminuria, with only a few erythrocytes microscopically, and with no symptoms except lassitude. The nephritic changes seem to follow mild as readily as severe tonsillitis. Many of the nephritis cases run a course to death, some recover completely and a third class have repeated acute exacerbations. One observer reported as high as 75 per cent of his cases of tonsillitis followed by albuminuria.

The temperature changes which occur in accessory sinus infections can frequently be traced to the pyelitis which is set up as a metastatic process. This is true, too, of suppurative otitic disease. It has not been an infrequent experience to observe small children with an acute otitis, with a high tem-

perature, where the question has arisen as to the necessity of a mastoid operation, where a careful urinary examination has disclosed a pyelitis as the causative factor and not a mastoid complication. Let us emphasize that you insist upon a quantitative statement of the formed elements, without which you cannot form a correct estimate of conditions.

The presence of glucose is important. Prognosis is markedly affected by it. Treatment is made much clearer. If the sugar content of the blood can be lowered, suppurative processes are relatively easily handled. Ordinarily, but not constantly, the rendering the urine sugar free is a good index. Occasionally the percentile sugar content of the blood may remain high, although no sugar appears in the urine. This rarely occurs in diabetes, and it is here that the condition is most important, rendering infection of the wounds much more likely than with the healthy person, probably on account of two factors: the altered metabolism of the body renders the tissues less resistant to bacterial invasion, and the presence of the added glucose to the serous fluids of the body makes them even better culture media, despite the bactericidal substances present. In major operative procedures which are not of an urgent nature, such as a mastoid of not a very acute type, laboratory control of the results of dieting and medication of the patient to determine the most advisable moment to undertake operation can be readily carried out and renders the prognosis of the case much better.

Acetonuria is of variable import. Whether an associated diabetes exists should be carefully determined. It may follow anesthesia. Its importance lies in the fact that it may indicate an acidosis so grave that it accounts for symptoms or contraindicates operative interference for the time. The determination of the carbon dioxid capacity of the blood plasma measures for us the gravity of an existing acidosis.

Blood.—The importance of determining the coagulation and bleeding time has been pointed out in a previous paper. It concerns those cases where there is any suspicion of the existence of hemophilia or purpura. Unless predetermined, an unwarranted risk is assumed. The methods in use, while open to some theoretical objections are serviceable and give the information wanted. Each method has its own average time,

which should be known, and which may vary considerably from other methods. Practically all of them are simple and rapidly carried out.

In the observation of some five hundred patients, it was observed that the coagulation time might be prolonged and the bleeding time normal or vice versa—in fact, the authors were much impressed by the frequency of protracted bleeding time in individuals who showed a normal coagulation time. This brings up a most important point in connection with an operative procedure to be undertaken.

The chemical blood examinations are coming into greater and greater prominence. They will be treated later in this paper.

The value of the blood count is well proven. Both the total and differential estimates of the white blood cells are valuable and always will be so, despite the frequent publication of cases where no help was derived. A further aid is secured by reducing the differential estimates to whole numbers rather than percentages or by applying one of the diagrammatic methods advocated by Gibson and Sondern. From time to time, the erythrocyte count and the hemoglobin estimation will prove of value.

Obscure suppurative conditions, as, for example, in a mastoid under suspicion, a progressive polynuclear count may prove to be the determining factor in advising operation. The leucocyte count forms a good index as to the resistance of the individual.

Sputum.—A sputum examination should mean a great deal more than it usually does and should be performed much oftener. Well does one of us remember facing a patient who had a mass on one vocal cord, who had been examined by four laryngologists of repute, as well as a widely known surgeon, who could not agree, in the absence of definite physical signs, as to whether the diagnosis was syphilis, carcinoma or tuberculosis. In five minutes a sputum examination settled the matter beyond doubt.

An examination should always give a good idea of the predominating organism or organisms as determined by smears: should include the gross characteristics, such as color, odor, sedimentation, elastic tissue, Curschmann's spirals and the

microscopic presence of blood, eosinophiles, and so forth, and very frequently should employ cultures to check up the result of the smears. Such an examination would be a real aid in determining pneumococcus types, in fixing asthmatic cases as bronchial in type and in differentiating bronchial and pulmonary conditions.

Spinal Fluid.—The findings secured by lumbar puncture are of great help bacteriologically following otitic disease. The cytologic examination should never be omitted, as it alone may determine a concurrent condition of importance. The test for reducing substances is of some aid, indicating whether an inflammatory process exists. The globulin tests, of which Noguchi's is the more sensitive, give some information.

Oppenheimer has pointed out the important aid to diagnosis secured by lumbar puncture. While recognizing the dangers of the procedure, he demonstrates its value in cases where doubt exists as to the process taking place. With a positive fluid the intracranial and intraspinal condition can be quickly determined and the prognosis possibly favorably changed by timely action. Changes discovered early make successful operation much more possible.

Only localized meningitis or abscess will give a negative fluid. In the face of negative findings, depending upon clinical conditions, one may wait and repeat the puncture later. High pressure of the fluid is very important. Normal or low pressure may mean nothing. The finding of organisms, especially the tubercle bacillus, is conclusive evidence. Normally six to eight cells per cubic millimeter are found and are almost all of the mononuclear type. Suppurative conditions yield a polynucleosis. Increased lymphocytes suggest tuberculosis, poliomyelitis or lues. Brain tumors and brain abscesses frequently cause only an increase in the pressure.

Serologic Tests.—Serologic examinations of the blood, spinal fluid and the serous effusions are now so widely used and so numerous that their value needs no emphasis.

Despite the fact that the Wassermann test for syphilis has been severely attacked for the thirteen years of its life, it has steadily held and gained a following. Theoretically, we know its weakness. Practically, above all opposition, it has proven of value. A great danger lies in the unquestioned

acceptance of its results. Conscientious serologists are urging a standardization of technic, rather than a development of modifications of the original technic. The method is not fool-proof yet, and incompetent technicians are giving cause for much of the distrust of the test and should not be tolerated. Many of them seem to have no conception of exactness of working. In our work the test has undoubtedly proven a great aid in determining what certain obscure conditions may be due to.

In reviewing our case histories, having performed the Wassermann reaction as a general routine over the past two years, we find a series of thirteen patients whose blood sera gave a very strongly positive reaction, who showed no signs which would be suggestive of syphilitic lesions in the nose, throat or ear. Another group of twenty-one cases was found whose complement fixation reaction was very strongly positive and who were suffering with the following conditions: One case of a tumor of the auditory canal, two cases of perforation of the nasal septum, four cases of suppurative ethmoiditis, two cases of leukoplakia, two cases of sound perceptive deafness, one case of ulceration of the mucocutaneous juncture of the nose, one case of optic neuritis, three cases of marked hemi-cranis, supposedly referable to the nose, one case of chronic suppuration of the maxillary sinus and one case of fissure of the lip.

One does not presume too much in making the statement that the great majority of these patients would not have had a proper diagnosis made if it were not for the fact that Wassermann reactions were made as a routine measure.

The more recently developed serologic tests for pertussis and tuberculosis are theoretically sound. As yet the latter can be considered only an aid, because the reaction may be given by an arrested case. The result must be checked carefully by clinical observation and in doubt should not be accepted without reservation. The pertussis test gives results early enough in the disease in a fairly large percentage of cases to make it well worth applying.

Complement fixation tests are now being used for determining the specific proteins that asthmatics and hay fever patients are anaphylactic to. The tests are performed with specific

antigens prepared from the animal, vegetable and bacterial substances which may play a part in a given case. Their value has not yet been established.

Almost all of these tests are open to the objection that they are not localizing in their results and therefore may not indicate what a particular focal process is due to.

Bacteriologic Examinations.—Two principal types of study are applied here, the first by smears and the second by cultures.

Smears demand more care and attention than they are ordinarily given. They are, in competent hands, of the greatest aid, and the otolaryngologist who fails to make several on each case so that appropriate stains may be applied, fails to use a valuable method. The Gram stain, too often improperly applied, gives an abundance of information. Bennett points out its value as: (1) Showing the type of predominating organism where in culture the organism might be swamped by faster growing varieties; (2) showing phagocytosis of a given organism, thus indicating the one for which a vaccine should be prepared; (3) to indicate the effect of a vaccine in use. He found that the organisms could often be classed with accuracy by smear, all of his work being checked up by careful cultures. The fusiform organism of Vincent's angina can only be secured by smear, as it does not grow on any known medium. He found the smear of value in prognosis also, because of the ability to differentiate simple, easily yielding conditions as those due to *M. catarrhalis*, from more stubborn ones, as those due to the streptococci. The fusiform organism always meant necrosis.

The bacterial flora varies greatly with the part studied, its state and the methods employed in studying it. Thus the nasal cavity of the normal healthy person contains very few organisms and those often in pure culture, seldom more than three kinds. Logan Turner has pointed this out and states that these are usually not virulent. The healthy accessory sinuses are most frequently found sterile. In catarrhal conditions the staphylococcus, streptococcus, pneumococcus, micrococcus catarrhalis, *B. influenza*, meningococcus, Klebs-Loeffler bacillus and tubercle bacillus are important invaders.

In the mouth a much greater variety is of course found upon the mucous surface, but when the tonsils are enucleated

and the organisms of the depths of the crypts studied, relatively few species are found and there in pure culture or small mixed groupings. Thus, Maclay found that staphylococci, streptococci and pneumococci occurred in pure culture in that order of frequency in eighty-seven out of two hundred and sixty-eight cultures. Negative smears meant nothing, as growths were commonly secured despite them. Moreover the smear might show a certain organism predominating while in culture another would promptly overgrow it. Tubercle bacilli were found by smear only once, and never by culture; guinea pig inoculation was not attempted. We know how often this last method has proven valuable in the work of numerous investigators. Hemolytic streptococci were determined seventeen times, but the viridans only once, which Maclay thinks was an error which would be corrected by using proper blood plates.

Cultures.—Cultures are of great value when positive. When negative, it is perhaps best to disregard them in most cases. At times they are of great help; for example, in tuberculosis, erysipelas or acute rheumatic fever, in ruling out possibilities. These statements do not hold, however, in the case of blood cultures. Here a positive or negative culture is always significant, as we have pointed out in a previous paper.

Lake distinguishes between a bacteremia where living organisms are practically continuously in the blood stream, and a pyemia, where their presence is casual. The clinical picture is usually clearly different. The prognosis depends largely on the basic condition. Bacteremia, which is rare in other bone diseases, is not so with mastoid conditions, but in our experience, has not been seen unless a complicating sinus thrombosis existed.

Oppenheimer, after stating the necessity for early operation in lateral sinus thrombosis, points out the characteristic phlebotic symptoms associated with mastoid disease, and advises operation in the presence of a positive blood culture, especially if of the streptococcus group.

In another paper, Oppenheimer has pointed out the value of blood cultures in metastatic complications of suppurative otitis media, especially in conditions due to streptococcus simulating the acute rheumatic fever. In five cases, in which the

otic condition has been somewhat lost sight of in the presence of an acute polyarthritis, blood cultures were positive and a sinus thrombosis was found. In one of the cases later blood cultures were positive, despite the fact that the jugular ligation and exsection had been performed. At autopsy vegetations yielding the same streptococcus recovered from the ear and sinus were found upon the heart valves. In this case streptococci were recovered by aspiration from the knee joint. The routine employment of blood cultures in many acute febrile conditions would undoubtedly clear up many obscure, unsatisfactory diagnoses and would probably render the prognosis more obvious in many of them.

The information which is derived from the laboratory in the taking of blood cultures in a case of otitic disease cannot be overestimated. Their negative findings as well as positive ones offer much guidance to the clinician.

The detection of a bacteremia should be possible in every case of sinus thrombosis at some time during the course of the disease, although it is possible that as the result of various causes, such as a sterile thrombus situated below the infected clot, for a time at least, might prevent a bacteremia from becoming evident; or the culture may be taken before the bacteria are thrown off into the circulation; in the latter instance, if the culture were taken a few hours later, the organisms could be found. It is also possible that the powers of hemic resistance are greatly increased, and all of the circulating bacteria might be caused to disappear within a comparatively short time by the highly developed bactericidal power of the circulating fluid, or it is possible that there may be such a small number of organisms in the blood that in the minute quantity examined they may not be found.

Following a mastoid operation where a sinus thrombosis is suspected but where symptoms are not sufficiently definite to warrant opening the sinus, and a blood culture has given negative results, it is most essential that subsequent cultures be taken. This method will be found of great value in clearing up an obscure case that might not be relieved by operation until a much later period. The rule can be laid down that in the presence of streptococci in the blood stream there is a septic focus and that further operative measures are necessary.

In the case where the sigmoid sinus has been attacked but the jugular vein has not been ligated, the persistence of a possible blood culture is an imperative indication for the ligation of the jugular vein. Should positive cultures remain after the jugular ligation it would be suggestive of a bacterial infection of the endocardium or a metastatic process in the lung.

In our experience, dealing with approximately one hundred and fifty cases of sinus thrombosis, we have never observed an infection due to any organism other than the streptococcus mucosus. This point has proven of very great value in expressing an opinion in many instances and shows the importance of making a culture from the pus contained in the mastoid process at the time of the operation.

For example, we have seen a number of cases where the infection in the mastoid was of the pneumococcus type, and where after the mastoid operation symptoms presented themselves which were suggestive of a complicating sinus thrombosis. The blood cultures were negative.

In counseling against operation upon the sinus in these cases, our patience was rewarded by noting the subsequent development of pneumonia, erysipelas or some other complicating condition which explained the symptomatology so much akin to that found in sinus thrombosis. One can see, therefore, the significance of the negative blood culture in conjunction with a nonstreptococcus type of infection.

In conclusion, we may say that cultures from nasal or tonsillar secretion or otitic pus blood, spinal fluid and the like give a great deal of valuable information which, carefully studied, makes the prognosis clearer, and in addition may form the starting point for the preparation of autogenous vaccine which, properly prepared and administered, provide us with one of our best methods for combating infection.

Tissue Examinations.—Joseph C. Beck, of Chicago, has repeatedly emphasized the value of the examination of material from mastoid operations. He is able to distinguish two types of acute mastoid involvement which he classified as (a) The cell route, which bleeds freely on operating, is soft, has most of the septa destroyed the bone appearing as chips in the swollen mucous membrane and healing rapidly, and (b) the vascular type, which bleeds little, is firmer, but other-

wise appears the same in the gross, the bone undergoing slow necrosis because of a minute thrombosis in which healing is much delayed by the necessity for the necrosed parts to separate. The streptococcus and micrococcus catarrhalis are the commoner organisms in the latter type, as against the staphylococcus, pneumococcus and the bacillus influenza in the first. Here, then, the etiology is of great importance. The laboratory aids in diagnosis and prognosis.

In chronic conditions the examination is equally important in distinguishing fibrous from cholesteatomatous, tuberculous, neoplastic and other conditions, while serologic tests clear up the cause for the sluggish healing of the luetic cases.

Likewise many workers have found examination of the lymphoid tissue of the nasopharyngeal and faucial regions of great help in diagnosing tubercular conditions.

Cutaneous Tests.—Certain cutaneous tests have now been developed which play an important part at times. The von Pirquet is the oldest of the group. In children it is undoubtedly of value, whether negative or positive. In adults it is so seldom and so quickly done that in appropriate puzzling cases it should be applied, with due allowance made for its limitations. The less sensitive tuberculin tests, such as the Moro test, may prove more valuable in adults in the long run.

The luetin test is rarely used, because of the cost and the readily available Wassermann test.

The Schick test is of the greatest value in prognosis. Care must be exercised in applying the test. The diphtheria toxin is readily secured and with care will keep for about six months. When diluted it should not be kept over twenty-four hours.

The specific proteins have recently come into use for diagnosing the particular causative agent acting in a case of pollen disease or bronchial asthma. Packets may be secured which contain extracts in powdered form of the specific proteins of many substances, both animal and vegetable. These are put in solution and applied to scratches on the skin, where reactions to one or more of them may occur, indicating some or all of the proteins which affect the patient. This gives opportunity for greater exactness in diagnosis, and if desensitization can be carried out, prognosis is improved.

Renal Functional Tests.—The renal functional tests are the

outcome of the work of a group of clinicians and physiologic chemists, which tests have reached a stage of perfection which warrants their very wide application. This statement especially applies to all who carry out surgical procedures under general anesthesia. J. B. Deaver very recently presented some of his figures, secured since using two of the tests, blood urea and phenolsulphonephthalein. Of 420 cases (tested) operated upon, 403 were considered suitable and only one died of uremia. Seventeen were reported unsuitable, and of these, operated upon only as a last resort, seven died of uremia. The same general results have been secured elsewhere.

The tests referred to are the estimation of the uric acid, urea nitrogen, creatinine, and sometimes sugar, of the blood and the red or phenolsulphonephthalein test. Their use is indicated wherever the urine examination or history presents any suspicion of nephritis or diabetes. The blood chemical tests indicate the grade of kidney injury or the working capacity of the kidney, while the phenolsulphonephthalein test gives only the function of the moment. The blood chemical group is the more important, but the phenolsulphonephthalein test should not be neglected. When kidneys are injured, the uric acid content of the blood rises first, and as the injury becomes more grave first the urea nitrogen and then the creatinine are found increased. A rise of the last is of great portent. These tests can now be carried out complete on 10 cc. of oxalated blood by a very recent method devised by Folin and Wu. The tests should be done only by a well trained chemist, and are exact and relatively simple.

Whenever a major surgical operation is being considered and its need is not too urgent, a urine examination showing albumin, casts, pus, blood or a specific gravity so altered as to arouse suspicion of the functional capacity of the kidneys should lead one to have the blood examined chemically. If the uric acid or urea are moderately increased, no special anxiety need be entertained on this basis, but if the creatinine or sugar or both be raised, the prognosis becomes more grave, and especially if the creatinine content rise above 3 mg., or 100 cc. No person having over 5 mg. has lived many months. These tests can be employed with a resulting much greater sense of security on the part of the surgeon.

We have presented those tests with which we are most familiar and which have proven useful upon employment in our work. There are undoubtedly others which we have overlooked.

This does not weaken our contention that the practice of medicine, including our specialty, is uncertain enough, even with every safeguard thrown about it, for us not to ignore these very valuable aids. In the last analysis, as we have pointed out, the clinical picture is equally important, and in case of a conflict between the two, that man who studies and employs both thoughtfully is the one who will best be able to decide which to take as his guide at the critical moment.

45 EAST 60TH STREET.

BIBLIOGRAPHY.

1. Beck, Joseph C.: Laboratory Methods as Aids in the Diagnosis of Nose, Throat and Ear Affections. Transactions. Am. Rhin. and Otol., Sec., p. 315-319, 1910.
2. Beck, Joseph C.: The Microscopical Anatomy of Acute and Chronic Mastoid Disease. Trans. Chicago Path. Sec., 1909-11, VIII, 162-172.
3. Beck, Joseph C.: The Surgical Pathology of the Mastoid. Annals Otol., Rhinol. and Laryng., 1918, p. 869.
4. Bennett, A. B.: The Gram Stain in Making Bacteriologic Diagnosis. Ann. Otol., Rhinol. and Laryngol., XXV, p. 375, 1916.
5. Deaver, J. B.: The Value of the Laboratory to the Surgeon. Therap. Gaz., XLIII, p. 1, 1918.
6. Folin and Wu.: System of Blood Analysis. Jour. Biol. Chem. XXXVIII, p. 81, May, 1919.
7. Lake, R.: Aural Bacteremia (as Apart from Pyemia). Jour. Laryngol., Rhinol. and Otol., XXXIV, p. 110, Apr. 1919.
8. Loeb, H. W.: Acute Nephritis Following Tonsillitis. Trans. Amer. Laryng. Rhinol. and Otol. Soc., p. 146 ff., 1910.
9. Oppenheimer, Seymour, and Gottlieb, M. J.: The Importance of Blood Examinations in the Surgery of the Nose and Throat. Amer. Jour. Surg. XXXI, p. 81, April, 1919.
10. Maclay, O. H.: The Bacteriology of Tonsillar Crypts. Laryngoscope XXVIII, p. 598, Aug., 1918.
11. Oppenheimer, Seymour: Lumbar Puncture in Otology. N. Y. Medical Jour., Dec. 19, 1918, p. 1176 ff.
12. Oppenheimer, Seymour: Some Remarks on Sinus Thrombosis with Particular Reference to the Diagnostic Value of Blood Cultures in Otitic Disease. Annals Otology, Rhinol. and Laryng., Mar., 1911.
13. Oppenheimer, Seymour: Metastatic Complications of Suppurative Otitis. N. Y. Med. Jour., Jan. 9, 1915.
14. Turner, A. Logan: The Spread of Bacterial Infections from the Nasal and the Naso-Pharyngeal Cavities by Way of Lymphatic Channels. Ann. Otol. Rhinol. and Laryng., XX, p. 751, Dec., 1911.

XLVII.

ANGIOMAS OF THE LARYNX. REPORT OF THREE
CASES.*

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True angiomas of the larynx are unusual. They may occur primarily in the larynx, but more often they are associated with similar conditions about the face and mouth and of the upper air passages. Histologically the tumors are divided into two types: (1) Hemangiomas and (2) lymphangiomas. Pseudoangiomas may be included as a third type in a consideration of angiomas in general. Hemangiomas are subdivided into two types, simple and cavernous. Pseudoangiomas include the varices and the various lymphectasizæ.

Several cases are reported in the literature as true vascular tumors in which the clinical picture indicates some form of varix or an organized clot in a fibroma or a polyp. Fauvel, in 1876, reported two cases of true angioma of the larynx. We have found no evidence of cases previous to this time. Fauvel also described a third case in which the tumor was manifestly papillary, but the vessels were so dilated that they formed veritable lacunar spaces which resembled true hemangioma; a definite diagnosis was not made in this case. Since that time a number of cases have been reported, and described as probably angioma, but sufficient clinical and microscopic evidence with which to make a definite diagnosis was lacking. Wolfenden, in 1888, reviewed the literature and found 12 cases, to which he added one of his own. In 1895 Koschier recorded a case of lymphangioma, the earliest which we were

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able to find. Mayer, in 1916, reviewed the literature carefully and reported 41 cases, including 2 of his own, but he did not differentiate the types. He verified 12 of the 41 cases mentioned in his article. Richardson, in 1917, contributed an article in which he reported one case of lymphangioma of the larynx. This is the only case of the kind we have been able to find reported in the American literature, although several have been recorded by European writers.

INCIDENCE.—In the 52 cases of true angiomas reviewed in the literature a conclusive diagnosis was reached in each case either by clinical or microscopic examination. The three cases observed in the Mayo Clinic, added to this group, make 55 cases.

Forty-four cases of hemangioma and 8 cases of lymphangioma have been recorded. The relative incidence of true laryngeal angiomas is small, as indicated by the finding of only 3 hemangiomas and no lymphangiomas in a series of 217 true laryngeal neoplasms observed in the Mayo Clinic. Table 1 summarizes the findings in the cases of angiomas collected from the literature and from our own cases.

AGE.—The youngest patient having a hemangioma was ten weeks (Levbarg's case); one of our patients was eleven weeks. The oldest patient was sixty-two years (Loomis).

HEMANGIOMAS.

Patients under 20 years	6
Patients between 20 and 30 years.....	5
Patients between 31 and 40 years.....	5
Patients between 41 and 50 years.....	5
Patients between 51 and 60 years.....	5
Age not stated	21

LYMPHANGIOMAS.

Patients 16 years.....	1
Patients 28 years.....	2
Patients 40 years.....	1
Patients 48 years.....	1
Patients 55 years.....	1
Age not stated.....	2

SEX.—Twenty-two of the 47 patients with hemangiomas were males, 10 were females; in 15 case reports the sex was not given. Our 3 patients were females. According to Mayer, angioma of the larynx occurs approximately twice as often in males as in females. Five of the 8 patients with lymphangioma were males, 2 were females; in one case the sex was not given.

SYMPTOMS.—Angiomas of the larynx are believed usually to be congenital. The symptoms are similar to those of any other benign laryngeal neoplasm, but they vary in intensity according to the size and character of the tumor. It is the general impression that angiomas do not increase in size after the patient is 10. Our tabulation shows that the symptoms occur most often after the age of 20, which would indicate some exciting cause as a factor.

Hoarseness is most often the first symptom complained of; it may be intermittent, especially in cases of true angioma without solid tumor formation, or it may gradually increase over a period of years till finally speech is lost. Complete respiratory obstruction is not often seen in these cases because of the relatively small size of the growth, but when it occurs tracheotomy usually is necessary.

Some of the patients have recurring attacks of hemorrhage, which may result fatally, as happened in a case described by Ferrari. In case an intralaryngeal examination has not been made hemorrhage may be the first symptom to suggest angioma. The severity depends a great deal on the vascular qualities of the tumor as well as on the coagulability of the patient's blood.

Bioggi, in 1916, reported a case at the Eighth Congress of the Italian Society for Laryngology in a hemophiliac aged 42. The tumor was expectorated spontaneously; a severe hemorrhage followed which was checked by gelatin enemas.

Blegvad, in 1908, reported a case in the Proceedings of the Danish Oto-Laryngological Society. The patient came for observation because of sudden expectoration of blood fourteen days before; hoarseness had existed for several months. The tumor was the "size of a millet seed." Microscopic examination revealed a true hemangioma.

Levbarg, in 1918, reported a case in a baby ten weeks old in which the first laryngeal symptom was severe dyspnea, but the child had had paralysis of the upper left extremity since birth, also small angiomas on the left temporal region, hard palate, uvula, and neck.

Ryerson, in 1912, reported a case in which the patient had difficult and oppressive breathing, without hoarseness or cough. Brown reported the case of a patient who complained of an uneasy sensation on the right side of the larynx for three weeks without other symptoms. One of the cases reported by Fauvel demonstrated the occurrence of intermittent hoarseness which sometimes is found in the cavernous angiomas.

Pain is very infrequently associated with benign neoplasms of the larynx, unless a secondary infection is present. Chiari's⁷ case is the only one of angioma in which pain was the chief complaint. All but two of the cases reported were either suspected or definitely diagnosed during life. Loomis' and Phillips' and Ruh's cases were found at necropsy.

The shortest duration of symptoms was three weeks; one patient was hoarse for nine years before a diagnosis was made.

LOCATION OF THE TUMOR.—Angiomas of the larynx, when associated with similar conditions elsewhere, may involve the extrinsic structures as well as the intrinsic, but when localized in the larynx are most frequently found in the true and false cords. In a few cases more than one laryngeal structure was involved by a single growth.

Structures involved in 47 cases of hemangioma:

Right cord	8	Right ventricular band.....	6
Left cord	9	Left ventricular band.....	4
Both cords	5	Right arytenoid.....	2
Anterior commissure	3	Left arytenoid.....	2
Right hyoid fossa	1	Subglottic area.....	7
Mucous membrane of larynx from cords down to third tracheal ring.....	1		

One of our patients, a baby eleven weeks old, had a cavernous hemangioma over the scalp and nose, associated with the laryngeal tumor.

Structures involved in eight cases of lymphangioma:

Left arytenoid epiglottic fold.....	1
Right cord.....	2
Left ventricular fold	2
Right arytenoid epiglottic fold.....	1
Right false cord and right aryepiglottic fold...	1
Cord (side not stated)	1

CLINICAL FINDINGS—The macroscopic picture of all true laryngeal hemangiomas is about the same; also all lymphangiomas present a characteristic clinical picture. The pseudotypes vary according to the kind of tissue predominating if it happens to be part of a degenerative change in a solid neoplasm, or if it is a varix, according to the size and number of vessels present.

A true cavernous hemangioma is the most frequent type and varies in size from 0.2 cm. to 2.5 cm. It may be found attached to one or more laryngeal structures, always of a dark bluish or purplish color, rarely pulsating (Fig. 1). A few cases of true cavernous hemangiomas are reported as pedunculated, but usually they have a broad, flattened base. The chief clinical characteristic is a bluish dark colored tumor, smooth surfaced, which feels soft, flattens out or decreases in size on pressure with a probe. Loomis and Ryerson describe multiple cavernous hemangiomas.

Simple or superficial angiomas are usually of the same color as the cavernous types, but a few are bright red. They have no tumor formation, simply being a flattened vascular structure confined to the mucous and submucous tissues. Examination with a probe in this type is of little value. These tumors are often more extensive than the cavernous type, sometimes involving almost the entire larynx and part of the trachea.

Lymphangiomas may have a smooth or papillary surface; they are relatively larger than the hemangiomas. According to Harmer, they are pale and transparent (Fig. 2). On examination with a probe the tumor offers more resistance than do the hemangiomas. According to the cases reported, lymphangiomas are single; sometimes a lobulated tumor appears as two distinct growths.

The varices present a tortuous clump of vessels, often pulsating, usually a brighter red than angiomas. Clinically it is often hard to differentiate a simple varix from a simple or superficial hemangioma, while the cavernous types are distinctly characteristic.

DIAGNOSIS.—Most cases reported in the literature have been diagnosed necessarily from a clinical examination, especially in cases of children, when it is difficult to get the required data. Because of the similarity between true hemangiomas and the pseudotypes, a clinical diagnosis is not always correct. A microscopic examination is essential to an absolute and accurate diagnosis. In the lymphangiomas a correct percentage of clinical diagnoses would be much larger than in the hemangiomas. We believe that all the cases reported in which a microscopic examination was not made should be classified according to the author's opinion, unless the description points conclusively to some other condition. If a laryngoscopic examination can be made, there should be very little difficulty in differentiating true angiomas from malignancies of the larynx.

It is undoubtedly true that all laryngeal neoplasms are associated, in some way, with continuous irritation of the larynx. Granting that true laryngeal angiomas are congenital, the majority manifest themselves between the second and fifth decades of life. The first symptoms may be noticed suddenly following an acute exanthema or the onset is gradual, most often associated with a chronic inflammatory condition of the upper air passages.

So far as we know, there is no definite association with other general pathologic conditions. In one of our cases in which the growths, two in number, were attached to the left side of the anterior commissure and the left arytenoid, respectively, we found tuberculosis in the right upper lobe, and dilatation of the arch and descending aorta. Many case reports contain no note of general findings. In another of our cases the blood chart showed 20 per cent hemoglobin, 3,002,000 red cells, 7,600 leukocytes, polynuclear neutrophils 14.5 per cent, large lymphocytes 10.0, small lymphocytes 66.5, eosinophils 8.5, basophils 0.5; anisocytosis was marked, poikilocytosis and polychromatophilia were slight; this was a case of secondary

anemia in a baby aged eleven weeks. In our third case all general findings were negative.

Symond's patient contracted syphilis ten years before his examination. The first symptom noticed by him was hoarseness, which improved when he took potassium iodid. In Phillips' and Ruh's case the onset of symptoms followed an attack of measles. McKinney's patient had primary lues four years before his examination, followed at different times by secondary manifestations, including paralysis of the left arm. Levbarg's patient had had paralysis of the left upper extremity since birth.

Pathology.—Simple hemangiomas consist of newly formed capillary blood vessels, with either thin or thickened walls, and surrounded by a stroma of connective tissue.

Cavernous angiomas are made up almost entirely of a new growth of tissue composed of various shaped blood spaces lined with endothelial cells. They vary in size and usually are found surrounded by large quantities of fibrillar connective tissue containing small quantities of smooth muscle tissue (Fig. 3). The tissue is dented with alveoli, which communicate with one another. The blood in these alveoli retains its normal qualities.

Pseudoangiomas consist of dilatations or enlarged spaces in preexisting vessels of normal tissues, or may sometimes be found as part of the vascular structure of a benign neoplasm.

Lymphangiomas involve the lymph system. Their chief characteristic microscopically consists of new growths filled with dilated lymph spaces; these spaces are lined with endothelium and are supposed to originate in new formed lymph channels. In most cases in which tissue was available a substance resembling true lymph was found. Varying amounts of connective tissue have been found between the vessels; in some places they seem to be almost in direct contact (Fig. 4).

TREATMENT.—Various methods of treating angiomas have been reported. Wolfenden believed the danger from hemorrhage to be so great that he advised no interference unless great difficulty in respiration developed. Angiomas, like other laryngeal neoplasms, sometimes require a tracheotomy to relieve the dyspnea. Intubation in such cases is not safe be-

cause the trauma associated with such procedures is likely to produce severe hemorrhage.

Ryerson was the first to use radium in the treatment of a laryngeal angioma. We have used radium in two of our cases with excellent results and believe it is specific for all true vascular growths of the larynx, as well as other parts of the body. The pseudoangiomas, such as fibromas with vascular formations, do not respond so well to radium. This type, if the growth is small and pedunculated, can usually be removed with laryngeal forceps by the indirect method.

True angiomas or nodular pseudoangiomas, if small, can often be satisfactorily treated by fulguration, or the electric cautery. Radical operations, such as thyrotomy with or without the cautery, should never be done except when all other methods fail to relieve the distressing symptoms, or in cases of large angiomas in which the danger of hemorrhage from removal is great. The method of choice in treating all laryngeal angiomas is suspension laryngoscopy and inserting radium directly against the tumor. In case operation is decided on in patients with large angiomas, thyrotomy with or without the cautery is preferable. It insures the best exposure and danger from hemorrhage is reduced to the minimum.

REPORT OF CASES.

Case 1 (180247), a girl, aged nine months, was examined in the Mayo Clinic December 12, 1916. When the child was three months old the parent had noticed a rattling in her throat and difficulty in breathing, which grew worse at night; the breathing might be described as an inspiratory stridor. She had some difficulty in swallowing. She had a slight cough and recurring attacks of vomiting. The urine and the X-ray of the chest were negative.

The laryngoscope revealed a dark bluish tumor in the left subglottic region bulging to the middle of the trachea. The mucous membrane was smooth, and the tumor was sessile, with dimensions approximately 1.25 cm. by 1.875 cm. The diagnosis was made from the history and the clinical examination.

The child's symptoms did not demand immediate relief, so we decided to use radium. January 13, 1917, a 50 mg. tube

was applied outside the larynx for five hours with 2 mm. of lead screening and one inch of wood distance. The child had improved considerably when last heard from, but we have been unable to learn the ultimate outcome of the case.

Case 2 (131602), Mrs. J. J., aged 45, came to the clinic May 25, 1915, complaining chiefly of rheumatism in her legs, which had developed four years before. The patient also had pain in the chest, which radiated to the shoulders and arms. Hoarseness was first noticed fourteen years before, and for several years was intermittent, but she did not consider this of any consequence. Two years before her examination she lost her voice completely; since then the hoarseness had been constant. There was no dyspnea, no expectoration, and no hemoptysis; the Wassermann test was negative. The X-ray of the chest showed marked bronchial thickening, tuberculosis of the right lobe, and dilatation of the arch and descending aorta.

Indirect examination of the larynx disclosed a small sessile tumor about the size of a pea, attached to the left arytenoid cartilage. It was dark blue, smooth, not pulsating, and when examined with a probe a deep indentation could be made. A small tumor was found attached by a pedicle to the anterior commissure, filling the anterior two-thirds of the glottis. It was a bright red, and resembled a polyp more than a cavernous hemangioma. Because of the large size of the tumor, an external operation was decided on. June 1, 1915, thyrotomy with cauterization was performed (E. S. Judd). Tissue from the pedunculated tumor showed an angiomatous fibroma. The small sessile growth microscopically showed a structure similar to a true cavernous angioma (Fig. 1).

Case 3 (90363), a baby girl, eleven weeks old, was examined at the clinic August 20, 1913. The child had been hoarse for five weeks, and since then had been gradually getting worse. She cried only with great exertion; dyspnea was marked. A slight cyanosis had appeared one week before, since when the child had vomited at intervals.

Examination showed a cavernous angioma on the right side of the nose, a small one, 1.25 cm. by 1.25 cm., in the right inner canthus and one over the left breast and one over the scalp. The larynx was not examined. The hemoglobin was

20 per cent; the red cells were 3,030,000 and the white cells were 7,600. The X-ray of the chest was negative. Because of the blood picture albuminate of iron was added to the milk feedings. August 22, 1913, intubation was performed, at Dr. C. H. Mayo's suggestion, and the tube was left in place for sixty-eight hours. Marked dyspnea followed the removal of the tube, but respiration improved gradually. When the child was examined again, September 2, 1913, she was breathing normally, and there was very little hoarseness. At this time radium was applied over the larynx, also to the angiomas over the face and scalp. October 24, 1913, the patient had gained four and one-half pounds in weight, and wheezed only slightly during respiration. Radium was again used. When the patient was last seen, December 16, 1913, all symptoms had disappeared; the angiomas over the face and scalp were hardly noticeable, and the hemoglobin had increased to 35 per cent. We have recently heard from the mother, who says the child is having no trouble.

The first indication in this case was the immediate relief of the dyspnea, and as the intubation relieved the distressing symptoms it did not seem wise to make a laryngoscopic examination. Our diagnosis, therefore, was made from the clinical history, and the association with true cavernous angiomas in other parts. As true angiomas are supposed to be congenital, the occurrence of laryngeal obstruction in such a young child, with other findings, and the fact that improvement in the symptoms followed the use of radium would strongly indicate a similar growth in the larynx.

REPORT OF CASES IN THE LITERATURE.

A few cases have been recorded which in some respects resemble true angiomas, but we have not included them in our tabulation either because the authors did not report them as true angiomas, or because of insufficient description.

Johnson, in 1865, reported a "vascular cyst" occurring in a man of 50; it was located in the anterior commissure.

Fourine, in 1867, found a "melanotic growth" on the epiglottis. Fourine is quoted by Heinze, whose article we read, but no description of the case is given.

Hooper, in 1884, described a case of nodular, sessile, bluish

neoplasm on the left cord. Microscopically it showed loose connective tissue, with large spaces full of blood and altered fibrin. The connective tissue was edematous and highly vascular, with no true organization of blood. This case was discarded as not being a true angioma.

Ferrari, in 1891, reported a case in which a rose red tumor, "the size of a hazelnut," was found beneath the left true cords. This was removed and excessive hemorrhage followed. The patient died from pneumonia. The growth was a telangiectatic angioma.

Schrötter, in 1891, found a "pea-sized" pedunculated varix on the left arytenoid epiglottic fold; it was removed, but a definite diagnosis was not made. Schrötter observed a patient who had a small nodule on the vocal cord, which was composed of a convolution of very small vessels, but he could not make a histologic diagnosis.

Chiari,⁶ in 1891, reported fifteen cases of tumors of the cords; eight of these he called fibromas, because the septa between the spaces were thicker than in cases of true lymphangioma, but Fein, in discussing them, declared his opinion that some of them resembled microscopically his case of lymphangioma.

Grant, in 1896, described a case of submucous hemorrhage of the vocal cord in a woman aged 24 years. He mentioned recurring attacks of bleeding, but on removal of the tumor there was practically no hemorrhage. No diagnosis was given. Chiari,⁷ in discussing this case, said he did not consider it a true angioma.

Milligan, in 1905, showed a series of photomicrographs, one a hemangioma of the left cord, and another lymphangioma of the vocal cord. He did not give the case histories nor did he mention whose cases these were.

Symonds, in 1905, mentioned a patient with a true angioma of the larynx who had been seen by Mackenzie, Wolfenden and Bond, but he did not state who had reported the case, and it was not, therefore, included as a new case.

Safranek, in 1911, described a case of a woman, aged 27 years. She had been hoarse since childhood. Both cords were thickened, and near the center of the left cord was a bright red, smooth, pedunculated tumor the size of a "pepper corn."

The tumor was surrounded by small elastic vessels which on pressure gave the feeling of being well filled. Safranek called this a "pedunculated angioma," or, possibly, a fibroma with change in the vessels.

REFERENCES.

1. Bean, C. E.: Removal of an intralaryngeal angioma. *North-west Lancet*, 1890, X, 70-71.
2. Bloggi: Quoted by Mayer.
3. Blegvad, N. R.: Angioma of the larynx. *Internat. Centralbl.*, 1910, XXVI, 93. (Also *Proc. Danish Oto-Laryngologic Soc.*, 1908.)
4. Brady, A. J.: Angioma of the larynx in a boy aged six years, removed under chloroform by an endolaryngeal method. *Jour. Laryngol., Rhinol. and Otol.*, 1901, XVI, 14-15.
5. Brown, M. R.: Report of a case of angioma of the larynx. *Jour. Respir. Org.*, 1889, I, 40.
6. Chiari, O.: Ueber Cystenbildung in Stimmbandpolypen. *Wien. klin. Wehnschr.*, 1891, IV, 979-983. (Quoted by Fein.)
7. Chiari, O.: Ueber Angiome der Stimmbänder. *Arch. f. Laryngol. u. Rhinol.*, 1896, V, 100-114.
8. Elsberg, L.: On angioma of the larynx. *Arch. Med.*, 1884, XI, 12; 14.
9. Fauvel, C.: *Traité pratique des maladies du larynx*. Paris, Delahaye, 1876, 931 pp.
10. Fein, J.: Lymphangioma cavernosum eines Stimmbandes. *Wien. klin. Wehnschr.*, 1902, XV, 725-727.
11. Ferrari: Quoted by Chairi.
12. Fourine: Quoted by Heinze.
13. Glasgow, W. C.: Cavernous angioma of the larynx, removal. *Am. Jour. Med. Sc.*, 1889, XCVII, 360-364.
14. Grant: Quoted by Chiari.
15. Harmer, L.: Ueber Lymph- und Hämangiome des Kehlkopfes und entzündliche Vorgänge in denselben. *Wien. klin. Wehnschr.*, 1902, XV, 623-627.
16. Heindl: Quoted by Menzel.
17. Heinze, O.: On angioma of the larynx. *Arch. Laryngol.*, 1880, I, 134-136.
18. Hooper, F. H.: A rare form of tumor (cavernous papilloma) of the vocal band. *Med. Record*, 1884, XXV, 562.
19. Johnson: Quoted by Heinze.
20. Jurasz: Quoted by Chiari.
21. Kidd, P.: A case of angioma of the larynx. *Brit. Med. Jour.*, 1888, I, 584-585.
22. Koschler, H.: Ein Fall von Lymphangioma. *Wien. med. Blätter*, 1895, XVIII, 103-106.
23. Levbarg, J. J.: Intubation for angioma of the larynx in a child ten weeks old. *Laryngoscope*, 1918, XXVIII, 867-868.
24. Loomis, H. P.: Angioma of the larynx. *Proc. New York Path. Soc.*, 1890, p. 30.
25. Loubert: Quoted by Mayer.
26. McKinney, R.: Angioma of the larynx; report of a case. *Jour. Laryngol.*, 1919, XXXIV, 49-51.

27. Mackenzie, M.: Diseases of the throat and nose. Philadelphia, Blakiston, 1880, I, 307.
28. Martuscelli, G., and Porfidia, G.: Tumore giganti della laringe (angioma in fase ealino-amiloidea). *Glor. Internaz. d. sc. med.*, Napoli, 1914, XXXVI, 210-215.
29. Mayer, E.: Angioma of the larynx. *Med. Rec.*, 1916, LXXXIX, 1084-1086.
30. Meyer, E.: Quoted by Mayer.
31. Menzel, K. M.: Zur Diagnose der Lymphangiome des Larynx. *Arch. f. Laryngol. u. Rhinol.*, 1904, XV, 178-184.
32. Milligan, W.: *Jour. Laryngol.*, 1905. *Proc. Laryngol. Soc. of London*, March 17, 1905.
33. Navratil, D. V.: Angioma of the larynx. *Internat. Centralbl. f. Laryngol.*, 1910, XXVI, 151. *Proc. Rhino-Laryng. Sect. of the Royal Hungarian Med. Soc.*, Budapest, Jan. 30, 1908.
34. Phillips, J., and Ruh, H. O.: Angioma of the larynx, especially its relation to chronic laryngitis. *Am. Jour. Dis. of Child.*, 1913, v. 123-130.
35. Pistre, E.: Contribution à la casuistique des tumeurs sanguines du larynx. *Rev. heb. de laryngol.*, 1911, II, 408-414.
36. Prokroffsky: Quoted by Harmer.
37. Richardson, C. W.: Lymphangioma of the larynx. *Laryngoscope*, 1917, XXVIII, 8-11.
38. Roux, F.: Quoted by Mayer.
39. Ryerson, G. S.: Angioma of the larynx. *Canad. Med. Assn. Jour.*, 1912, II, 111-113.
40. Safranek, J.: Ueber Blutgefässgeschwülste in den oberen Luftwegen. *Ztschr. f. Laryngol., Rhin. u. ihre Grenzgebiete*, 1911, IV, 353-360.
41. Schrötter: Quoted by Chiari.
42. Schwarz: Quoted by Wolfenden.
43. Seiler: Quoted by Wolfenden.
44. Solis-Cohen, J.: Morbid growths of the larynx. In: Ashhurst, J., ed. *International encyclopedia of surgery*, New York, Wood, 1884, V. 727.
45. Symonds, C. J.: Angioma of the larynx. *Jour. Laryngol.*, 1905, XX, 337.
46. Thurber, S. W.: Angiofibroma of the larynx. *Laryngoscope*, 1911, XXI, 878-879.
47. Vitto-Mässel, R.: Angioma cavernoso del seno piriforme sinistro. *Boll. d. mal. d. orecchio, d. gola e d. naso*, Firenze, 1906, XXIV, 109-114.
48. Wingrave, W.: Notes on the pathology of 50 cases of innocent laryngeal growths. *Jour. Laryngol.*, 1906, xxi, 215-221.
49. Wolfenden, R. N.: An angiomata of the larynx. *Jour. Laryngol.*, 1888, II, 291-294.

HEMANGIOMAS

No.	Author	Sex	Age	Duration of Symptom	Structure Involved	No. of tumors	Diagnosis	Associated general pathology	Reported	Remarks	Size of tumor
1	Fauvel, I		53	1 yr.	Ant. commissure	1	Micro.	None mentioned	Cavernous hemangioma		Filbert
2	Fauvel, II	M	37	72 mos	Lt. true cord	1	Micro.	None mentioned	Cavernous hemangioma		Pea
3	Heinze,	M	38	Several years	(1) Rt. vent. fold (2) Same, behind	2	Clin.	None mentioned	Cavernous hemangioma		Pea Half a lentil
4	Mackenzie				Rt. hyoid fossa	1	Clin.	None mentioned	Cavernous hemangioma	Description of cases very brief	Blackberry
5	Mackenzie				Rt. ventricular band	1	Clin.	None mentioned	Cavernous hemangioma		Blackberry
6	Elsberg	M	37	6 yrs.	Rt. true cord	1	Micro.	None mentioned	Cavernous hemangioma	Considerable hemorrhage on removal	Pea
7	Elsberg	M	28	5 yrs.	Rt. true cord	1	Micro.	None mentioned	Cavernous hemangioma		1 length of right cord
8	Kidd	F	50	8 yrs.	Lt. true cord	1	Micro.	None mentioned	True angiomas	Bilateral and pedunculated	1 length of cord
9	Schwarz					1	Clin.			Woffenden classifies it as true hemangioma	
10	Seller				Rt. true cord	1	Clin.		Hemangiomas	Called true angioma	
11	Woffenden	M	44	20 yrs.	Rt. false cord	2	Clin.		Hemangiomas	Supposed to be MacKenzie's case	Rt. false cord size of raspberry. Other very small
12	Brown	M	26	3 wks.	Lt. false cord	1	Clin.		Hemangiomas	Nothing done for patient	Almost length of false cord
13	Glasgow	M	20	5 mos.	True cord?	1	Micro.		True hemangioma	Removed by direct method	Pea

HEMANGIOMAS—Continued.

No.	Author	Sex	Age	Duration of Symptoms	Structure Involved	No. of tumors	Diagnosis	Associated pathology	Reported	Remarks	Size of tumor
14	Loomis	F	62		(1) Lt. ventricle (2) Lt. pyriform glottic fold	2	Micro. autopsy		True hemangioma		(1) Pea (2) Cherry
15	Bean	M	?		Rt. true cord	1	Clin.		Hemangioma	Nothing done	?
16	Bean	M	?		Free margin of rt. true cord.	1	Clin.		Hemangioma	Removed with forceps	?
17	Solis-Cohen	?	?			1	Clin.		Hemangioma	Mentions has had 2 cases in own practice. No data given	
18	Solis-Cohen					1	Clin.		Hemangioma	Described as bluish-black. Located most frequently on cords	Vary from pea to mulberry
19	Chiari				Rt. true cord	1	Micro.		True angioma	Billroth diagnosed it as a cavernous angioma. Chiari called it a varix.	1 mm. diameter.
20	Jurasz	M			Lt. true cord	1	Clin.		Hemangioma		Larger than a lentil
21	Jurasz	M			Rt. true cord	1	Clin.		Hemangioma	All treated with caustic punctures	as large as a lentil
22	Jurasz	F			Ant. half of rt. cord	1	Clin.				
23	Brady	M	6		Subglottic ant. commissure	1	Clin.		Angioma		Cherry
24	Symonds	M		10 yrs.	Band rt. ventricle	1	Clin.	Syphilis	Angioma	Patient had lues 10 yrs. before exam.	?
25	Wingrave	M	43		Lt. true cord	1	Micro.		True angioma	Reports 18 angiomias; only 1 true hemang.	?
26	Vitto-Massei		50	4 yrs.	Lt. pyriform sinus	1	Micro.		Cavernous angiomias		Large

HEMANGIOMAS—Continued.

No.	Author	Sex	Age	Duration of symptoms	Structure involved	No. of tumors	Diagnosis	Associated general pathology	Reported	Remarks	Size of Tumor
27	Navrotil	F	31	9 mos.	Lt. true cord	1	Clin.		True angioma		Extended beyond left cord.
28	Blegvad	M	?	Few mos.	Lt. true cord	1	Micro.		Angioma		Millet seed.
29	Safranek	F	51	6 mos.	Rt. arytenoid	1	Clin.		Cavernous angiomas		Smaller than ten cent piece.
30	Pistre		51		Rt. true cord	1	Micro.		Cavernous angiomas		
31	Thurber	M	31	3 yrs.	Rt. ventricle	1	Clin.		Angioma		
32	Ryerson	F	55		(1) Lt. true and false cords (2) Rt. arytenoid	2	Clin.		Angioma	Radixm used successfully	(1) Raspberry (2) Smaller than raspberry
33	Loubert	?	?		Subglottic	1	Clin.		Angioma		
34	Phillips and Ruh	M	9 mos	4 mos.	Outer lateral wall extends from cords down to 3rd tracheal ring.		Dif. Micro fuse	Pneumonia stenosis of larynx.	Simple heman-giomas	Diagnosed at autopsy	Diffuse and flattened
35	Martuscelli and Porchia	M	32	4 mos	Filled lumen of larynx	1	Micro.		Angioma with an yloid degeneration	Mentioned by New in article an amyloid tumors of larynx.	Chestnut
36	Roux				Vocal cords					No data given except location of tumor	
37	Roux				Vocal cords					No data given except location of tumor	

HEMANGIOMAS—Continued.

No.	Author	Sex	Age	Duration of symptoms	Structure involved	No. of tumors	Diagnosis	Associated general pathology	Reported	Remarks	Size of tumor
38	Roux				Vocal cords					No data given except location of tumor	
39	Roux				Lt. arytenoid					No data given except location of tumor	
40	Mayer	F	52	1 yr.	Lt. false cord almost filling lumen of glottis	1	Micro.		Angioma	Removed by thyrotomy and cautery. Found 27 cases recorded including his own.	2 cm. by 1½ cm.
41	Meyer	M	13		Rt. vocal process and extended subglottically	1	Micro.		Cavernous angioma	Reported at Berlin Laryngological Soc. 1903	
42	Biogsi	M	42	2 yrs.		2	Micro.		Cavernous angioma		
43	Levharg	M	10 wks.	Since birth		1	Clin.	Hemangiomas, larynx and neck. Paralysis lt. upper extremity	Cavernous angioma	Intubation was done, x-ray treatment. Symptoms improved.	
44	McKinney	M	35	6 mos.	Pedunculated, attached subglottis to rt. cord.	1	Clin.?	Lues III Lues, paralysis lt. area.	Angioma		Pea
45	New and Clark	F	9 mos.	6 mos.	Lt. subglottic region.	1	Clin.		Cavernous angioma		1 cm. by 1½ cm.
46	New and Clark	F	45		(1) Lt. arytenoid cartilage. (2) Ant commissure	2	Micro.	T. B. rt. lobe Dilatation arch of aorta.	(1) Angiomatous fibroma (2) Cavernous hemangioma		(2) Pea
47	New and Clark	F	11 wks.	5 wks.		1	Clin.	Cavernous angiomas over face and scalp.	Cavernous angioma	Larynx was not examined	

LYPHANGIOMAS

Number	Author	Sex	Age	Duration of Symptoms	Structure Involved	Number of Tumors	Diagnosis	Associated pathology	Reported	Remarks	Size of Tumor
1	Koschier	M	40		Lt. ary. epiglottic fold	1	Micro.		Lymphangioma	Five months after removal it recurred and micro showed sarcomatous elements.	Walnut
2	Fein	M	38	Several months	Subglottic rt. cord	1	Micro.		Lymphangioma	Dark fluid escaped on removal	
3	Harner	F	16	10 yrs.	Rt. ary epiglottic fold	1	Micro.	Similar conditions at base of tongue	Lymphangioma	Seen in Chiari's Clinic.	
4	Menzel				Rt. ary. epiglottic fold		Micro.		Lymphangioma	Complete micro. description is given. Case history omitted.	
5	Heindl	M	48		Ant. 3rd rt cord		Micro.?		Lymphangioma	Seems to be some doubt as to whether this is a true lymphangioma	
6	Prokroffsky	F	55		Lt. ventricular fold		Micro.		Lymphangioma		Hazelnut
7	Prokroffsky	M	?		Rt. true cord		Micro.				
8	Richardson	?	?		Rt. false cord and ary. epiglottic fold		Micro.		Lymphangioma	Author states he has been unable to find a similar case reported	5 by 3 by 2 1/2 cm.

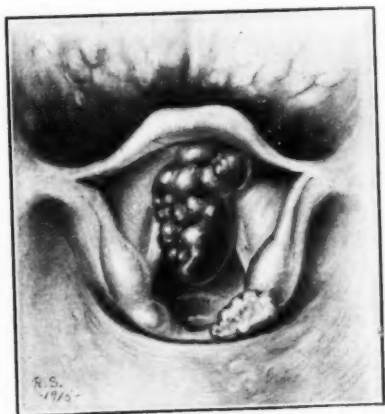


FIGURE 1.

Case A131602.—Angiomatous polyp and cavernous hemangioma.

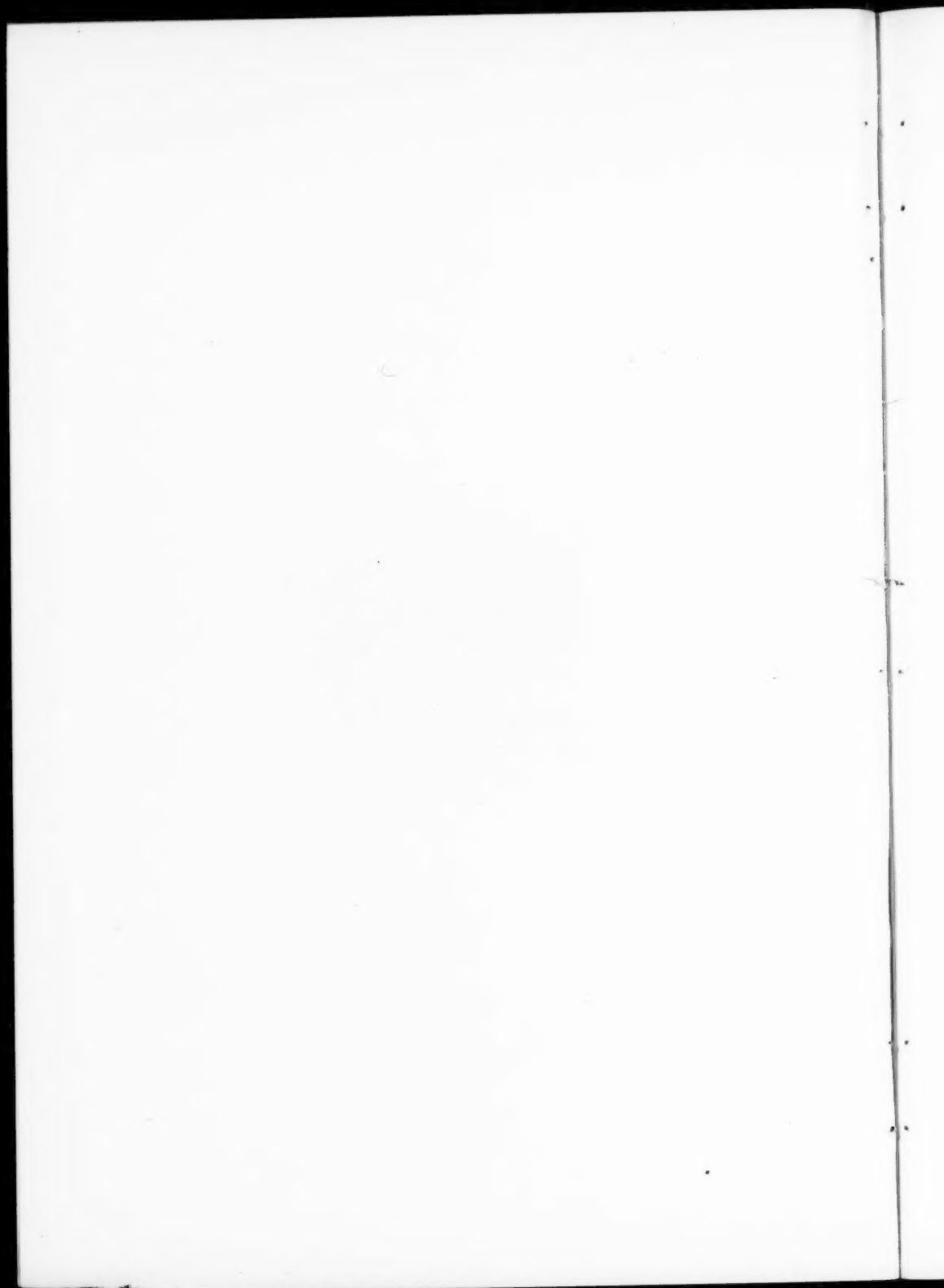
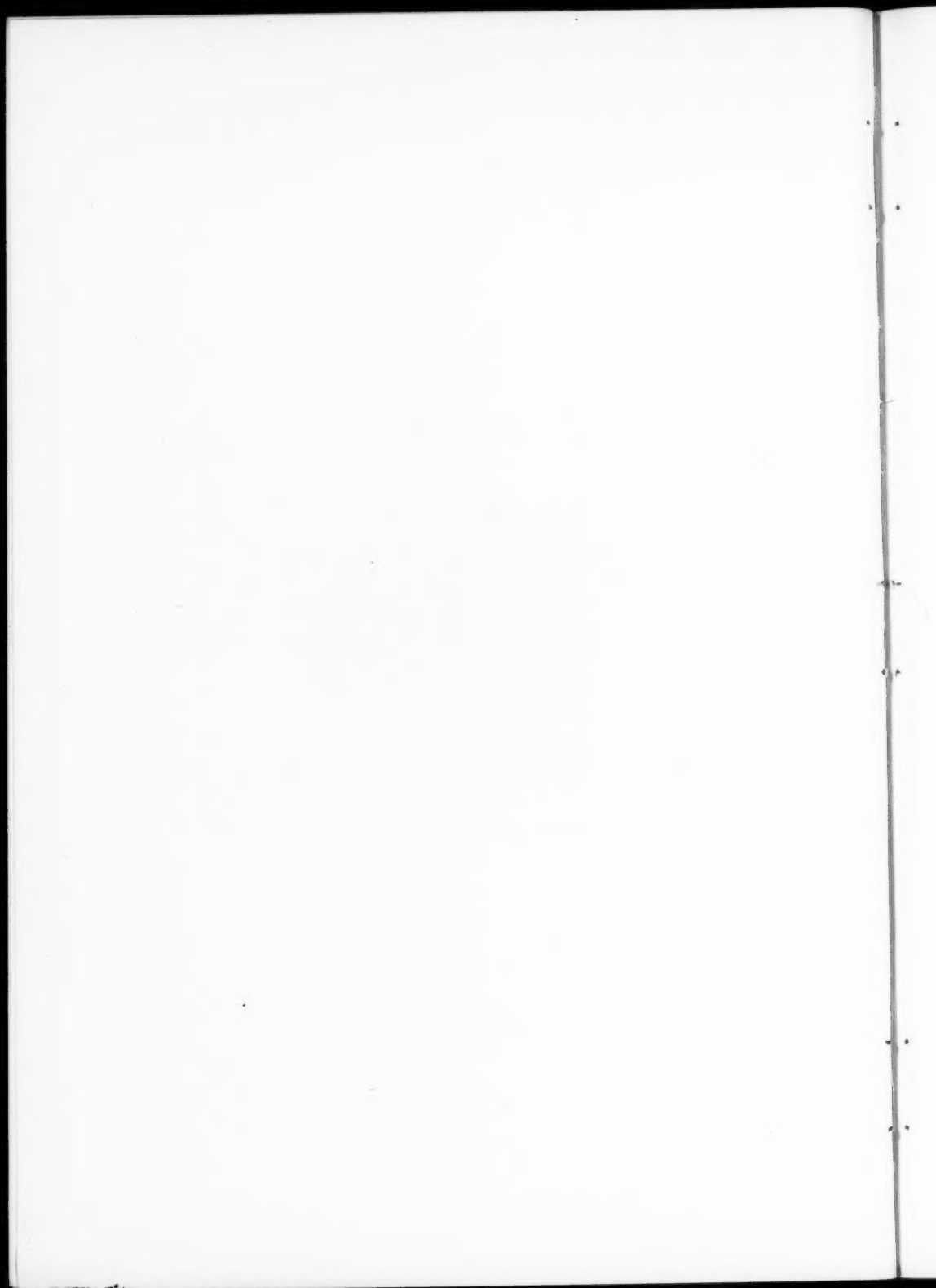




FIGURE 2.
Lymphangioma taken from Harmer's article.



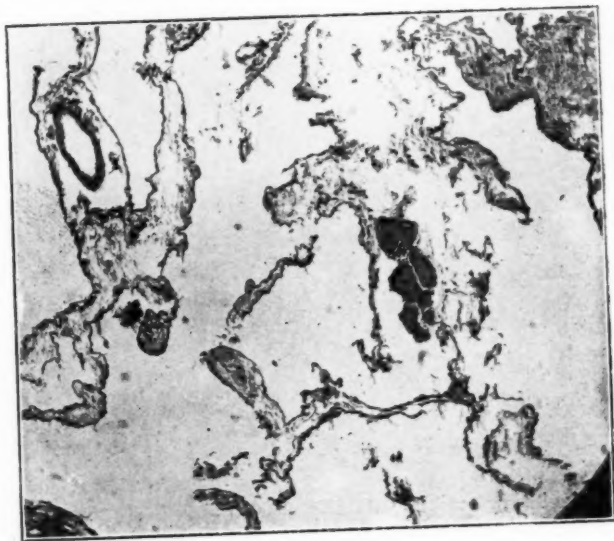


FIGURE 3.

Case 131602.—Photomicrograph taken from tissue removed from hemangioma.

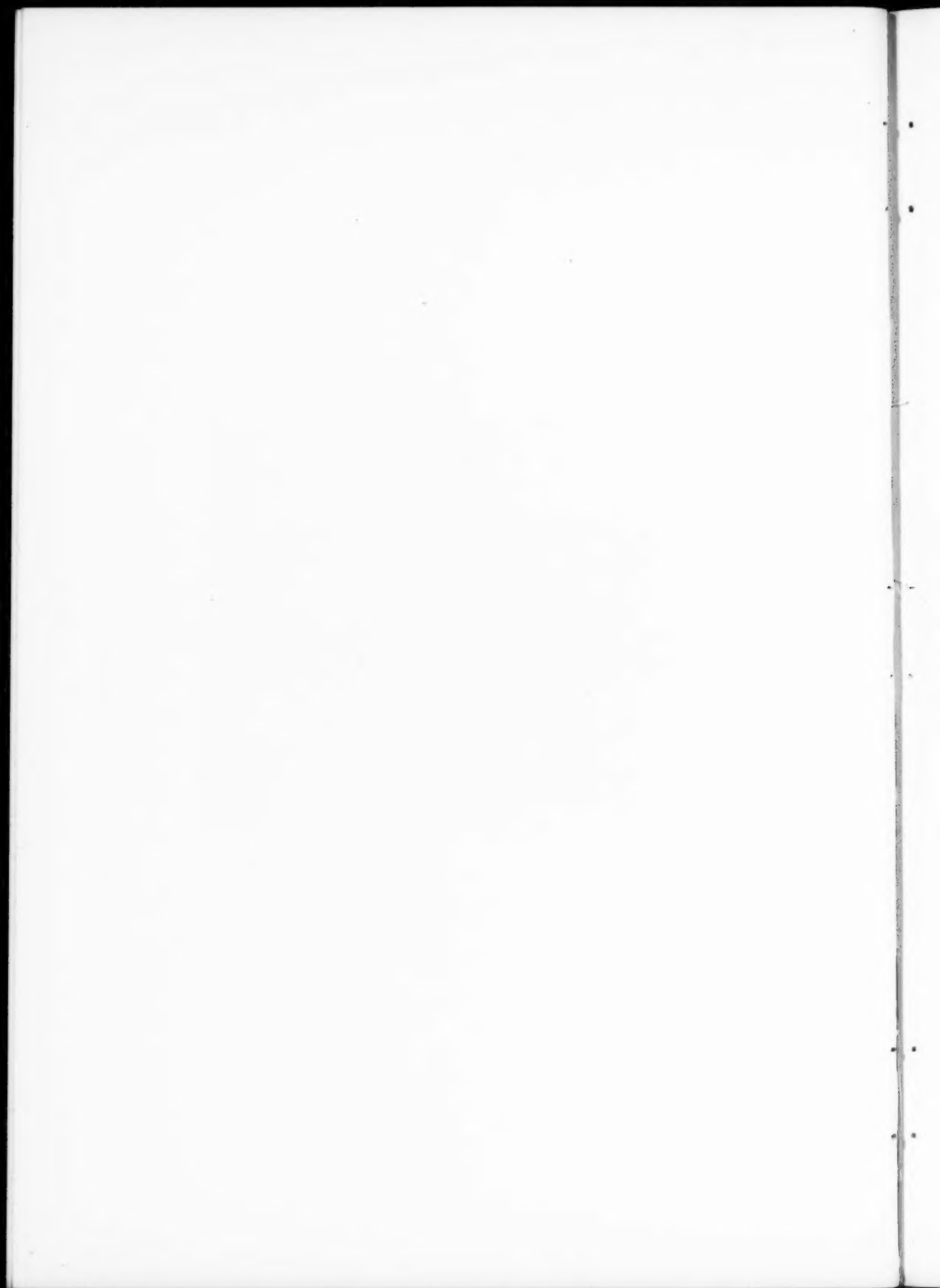
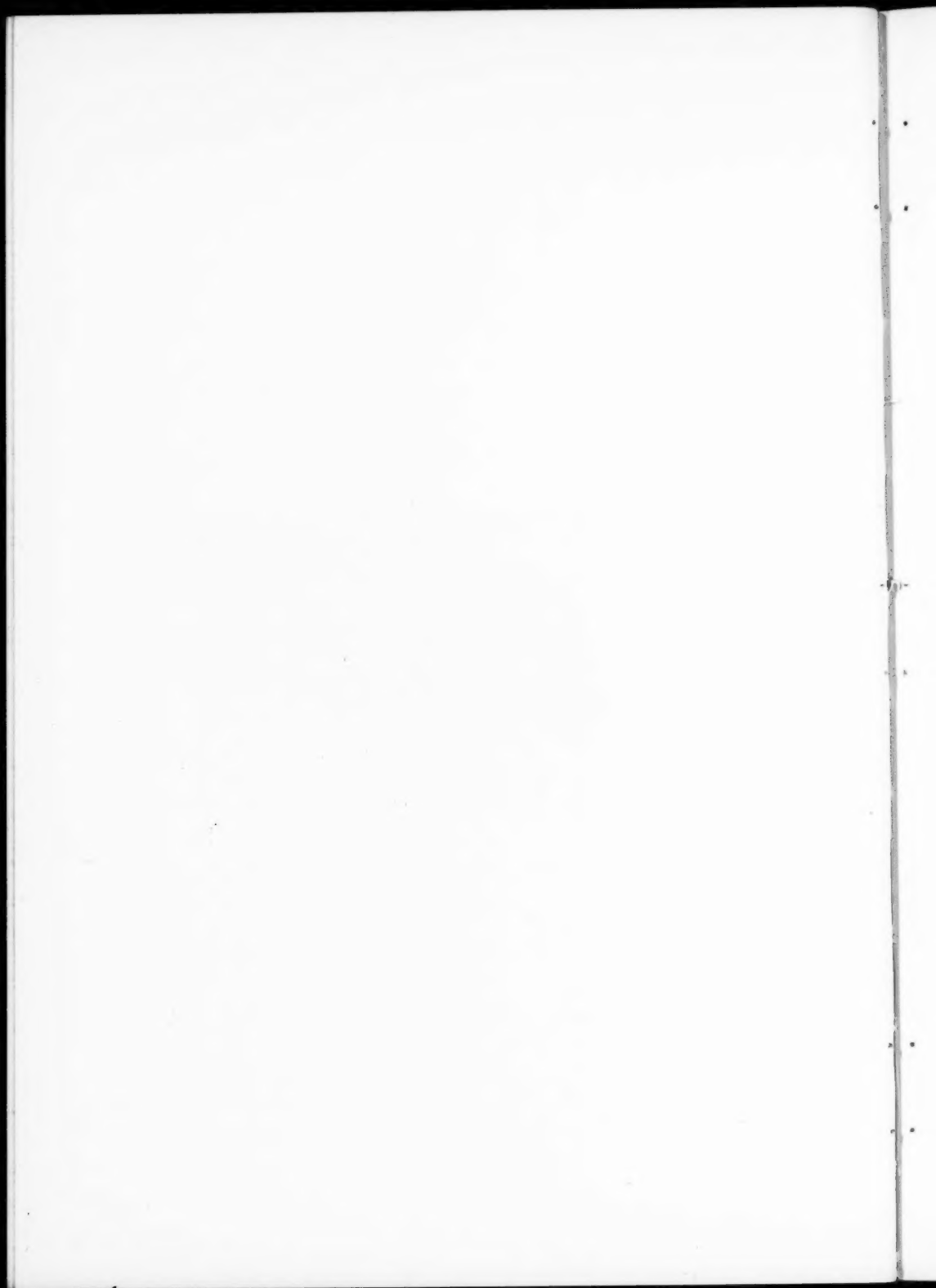




FIGURE 4.
Lymphangioma taken from Menzel's article.



XLVIII.

AN ETHMOID OPERATION.*

By J. A. PRATT, M. D.,

INSTRUCTOR OF OPHTHALMOLOGY AND OTOLARYNGOLOGY IN THE
MEDICAL DEPARTMENT OF THE UNIVERSITY OF MINNESOTA.

The only apology I have to offer for presenting an "Ethmoid Operation" to this society is that too many men allow ethmoid disease to pass by, either because they are unable to diagnose the condition or are afraid to operate.

Whenever the surgery of the ethmoid labyrinth has been presented to the societies I have attended, much stress has been placed on the uncinate process, the infundibulum, the bulla ethmoidalis, the hiatus semilunaris, the agger nasi cells and the accessory cells of the sphenoid, orbit, middle turbinate and the crista galli, to say nothing of the extreme danger of meningitis and opening into the orbit. I am not surprised that the majority of us are satisfied to remove the anterior end of the middle turbinate or turn the patient over to one of our colleagues. In my opinion, there are a number of points to know and remember. The anterior and posterior ethmoid cells comprise the so-called ethmoid capsule and are present at birth. To designate as we do the ethmoid labyrinth that portion lying between the two lateral plates of the orbit seems to me not only a misnomer, but very confusing. We occupy ourselves with one ethmoid region at a time, and as this consists in a maze of cells, it can rightly be called the labyrinth. We could still retain the name capsule but call the cells lying within the capsule the ethmoid labyrinth. The ethmoid capsules are separated from each other by two nasal spaces and the septum, and these spaces should not be included in the ethmoid labyrinth.

*Read before the American Academy of Otolaryngology and Otolaryngology at Cleveland, October 17, 1919, and the Milwaukee Academy of Otolaryngology, by invitation, October 20, 1919.

The later development of the frontal and sphenoid appears as an extension of the ethmoids, and they are so placed as to be easily treated surgically, after exenteration of the ethmoids.

The cribriform plate, or olfactory fissure, is entirely outside of the ethmoid capsule, and if the middle turbinate is left in place there is practically no danger, if the operator has a careful and delicate touch.

That we should be able to visualize our operative area and to do this we must know our anatomy.

The majority of the operators who have written in the past on surgery of the ethmoid have advocated the removal of the middle turbinate or a portion of it. I am referring particularly to writers in this academy and the otolaryngologic section of the American Medical Association. Whether these men are at this date still operating in this manner, I am unable to state.

I have not as yet found it necessary to remove any part of the middle turbinate in order to exenterate the ethmoids or open the frontal or sphenoid sinuses intranasally.

In my opinion, the principal cause of ethmoid trouble is some abnormality of the septum, and we must operate upon the thick as well as the deflected septi, restoring not only ventilation but equal distribution of air. Whenever the septum interferes with the ethmoid operation it should be operated upon first.

In my clinical work at the University of Minnesota, I find anterior ethmoid trouble when the frontal sinus is affected, and generally disease of the entire ethmoid capsule when the sphenoid is involved. It is thus seen that the ethmoid is the gateway to these troublesome sinuses.

When we visualize our sinuses, we find the lower part of the frontal in front of the anterior ethmoid; back of the anterior ethmoid and a trifle lower lies the posterior ethmoid, and back of the posterior ethmoid and a trifle lower is the sphenoid; so if we start in at the anterior ethmoid and work backward horizontally, we come finally to the posterior wall of the sphenoid. We can roughly measure to the posterior wall of the sphenoid by measuring the distance from the end of the nose to a point on the temporal side of the head, half way between the temporo-orbital edge and the auditory orifice.

Marking our patient at this point and knowing the average anterior and posterior measurements of the ethmoid labyrinth and sphenoid, we can tell at once just where we are in these structures.

While the operation I am to present is original, so far as I am concerned, undoubtedly hundreds of men are performing their ethmoid operations in exactly the same way. I have been unable to find a description that places us on familiar terms with these important structures.

Operation.—The instruments necessary for the operation are a nasal speculum; a nasal cutting forceps (Gruenwald, Myles, Hartman), with a fenestrated lower blade and a blade of three by five millimeters, the thickness of the blade being five millimeters, which is about one-half the width of a normal ethmoid capsule. I find the forceps with the universal handle the best, because the lower lip of the blade is stationary and you can place the blade just where you wish to cut, and there is no pulling back in the action. A double end cup-shaped curette twenty-two centimeters long with one end bent at an angle of forty-five degrees about two centimeters from the end, the cup in the angle end to be fenestrated. The handle is made octagon in shape so it can be firmly held at any angle.

With the patient in a sitting position, and the part cocaine-ized, the head is thrown well back, and if there is polypoid degeneration present, the anterior ethmoid cells are opened with the nasal cutting forceps, biting just under the anterior end of the middle turbinate and continuing backward and upward as long as there is soft bone encountered. As we progress backward, the head is brought forward so we can follow the hard plate of the skull. With a mental picture of the ethmoid capsule, bounded as it is on the orbital side by the lacrimal bone and the ethmoid orbital plate, nasally by the middle turbinate, superiorly by the temporo-orbital plate and posteriorly by three-fifths of the anterior wall of the sphenoid sinus, we take the straight end of the curette and with a firm but gentle stroke in every direction, curette out all the soft cells. If we find firm smooth yielding tissue under our curette on the orbital side, we know we are down to the periosteum of the orbit and force should not be used. With the angle

end of the curette any anterior cells are now removed, enlarging the space upward toward the frontal sinus. We now cut out the floor of the capsule back to the sphenoid sinus, giving a free open space under the entire length of the middle turbinate. There is little bleeding owing to the fact that we do not cut either the anterior or posterior ethmoid or the sphenopalatine arteries.

The cavity is now wiped out with large swabs, using a whirling movement to collect any particles of bone or débris, and then a large swab of cotton saturated with three per cent of iodine in glycerin is applied in the cavity for a few minutes to stop the bleeding and disinfect the cavity. With a dry cavity any overlooked soft portions can be removed. If the capsule does not show definite softening or polypoid degeneration, the straight end of the curette is possibly the best instrument to use to enter the anterior ethmoid cells; or it may be necessary to employ a chisel; however, after some experience the cutting forcep is generally used.

The cavity is not packed but a finger shaped piece of cotton is placed in the middle meatus and the patient is allowed to go home, with instruction to remove the cotton in four hours and report in three days. The home treatment consists of dropping a few drops of nasal oil into the nostril three times a day, having the patient in the prone position, with the head well back, and as the medicine is dropped into the nostril, to sniff violently. Every third day, after cocainizing and cleaning the nose, the cavity under the middle turbinate is swabbed with the iodine glycerin solution. In a short time, it is hard to detect that the nose has been operated upon.

If, after a suitable length of time the discharge does not cease, the nose can be recocainized and the operation easily extended into the sphenoid or, by the use of the Thompson-Good rasps, a large opening can be made into the frontal sinus.

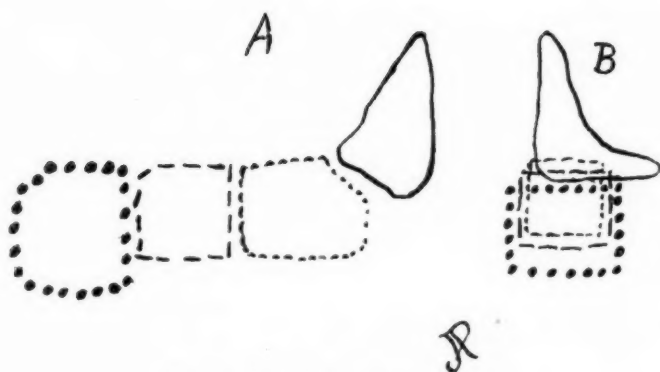
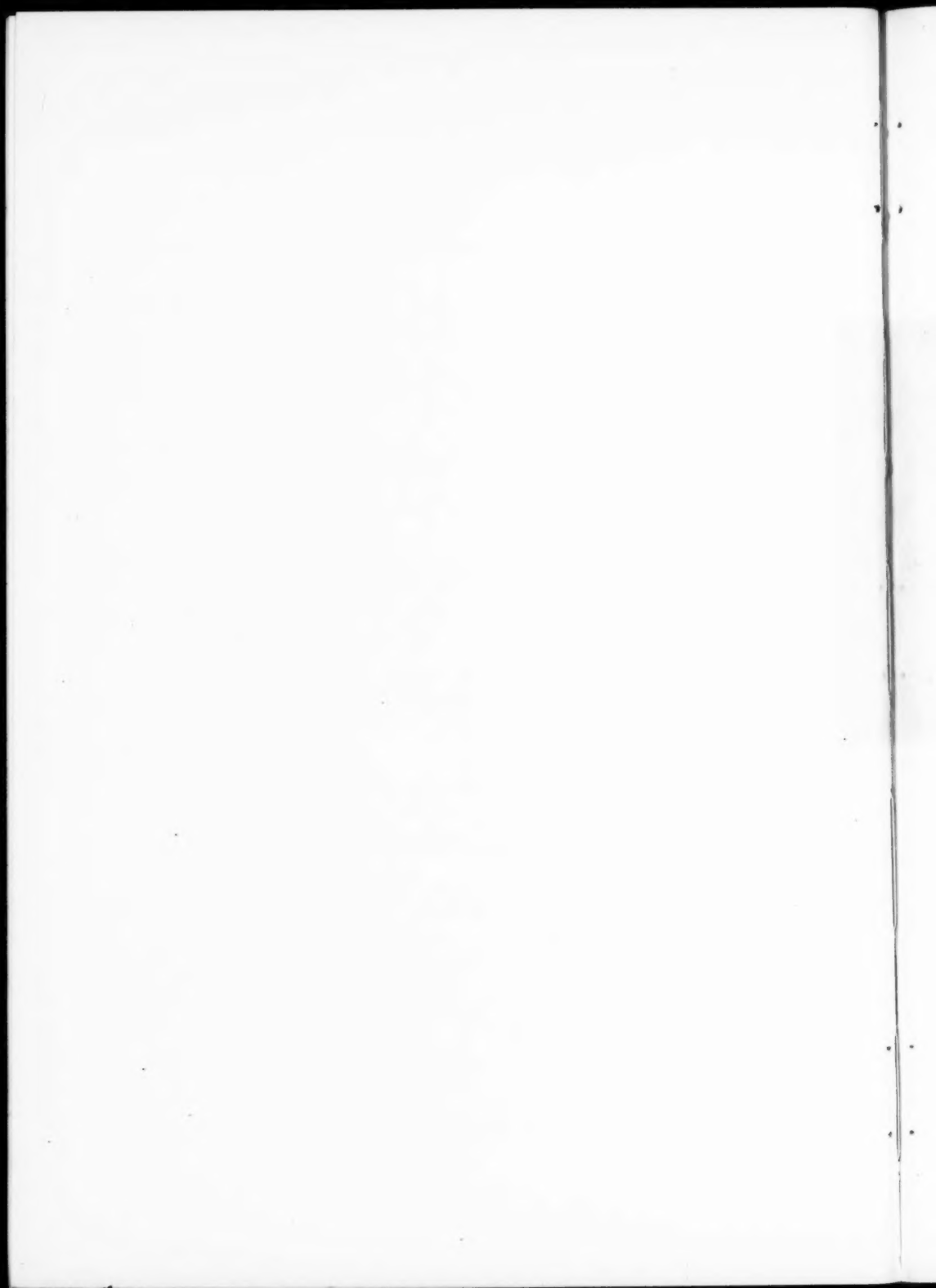


PLATE No. 1. DIAGRAMMATIC.

A. Showing a lateral view of the sinuses and their relative position. B. Showing an anterior posterior view and their positions from an operative standpoint.



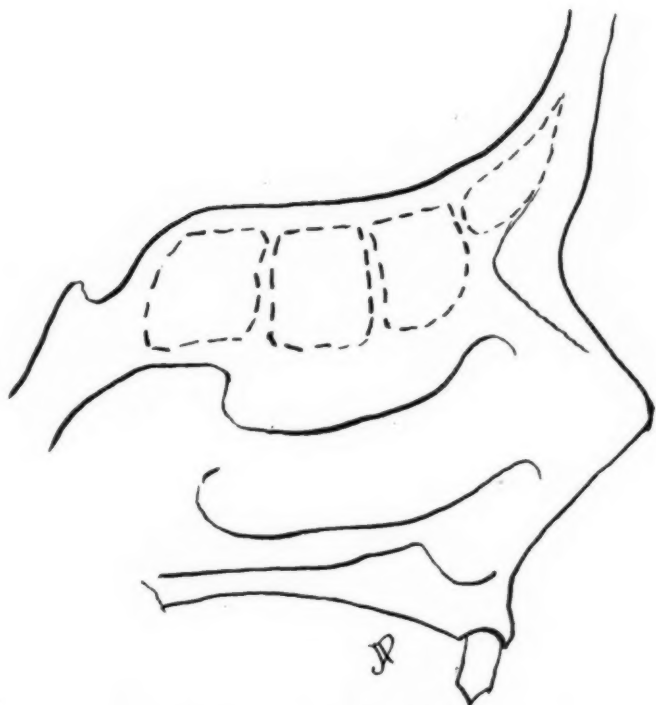
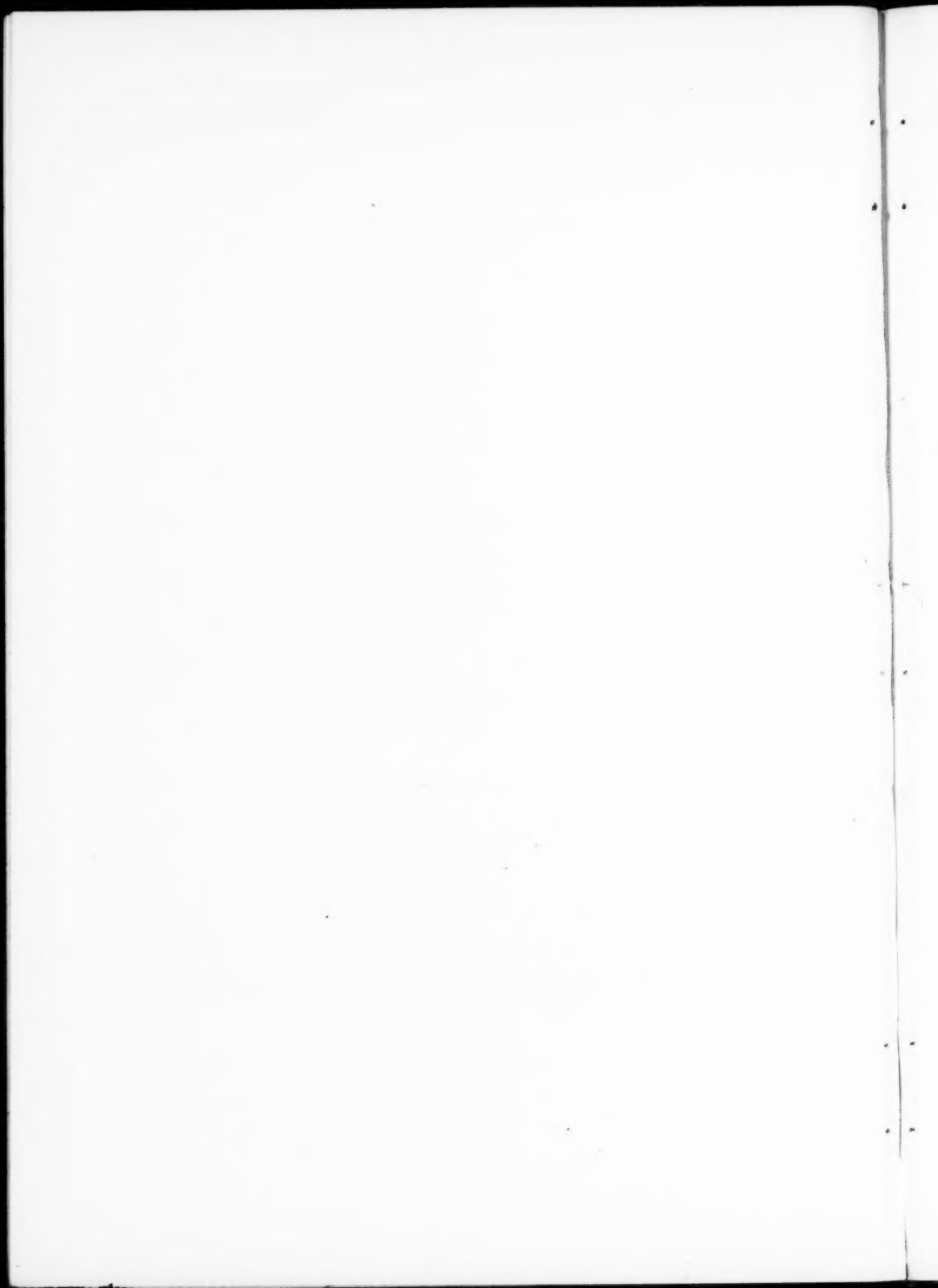


PLATE No. 2. DIAGRAMMATIC.

A lateral view with the sinuses in their relative position in reference to the middle turbinate. The anterior ethmoid is the gateway to the frontal sinus.



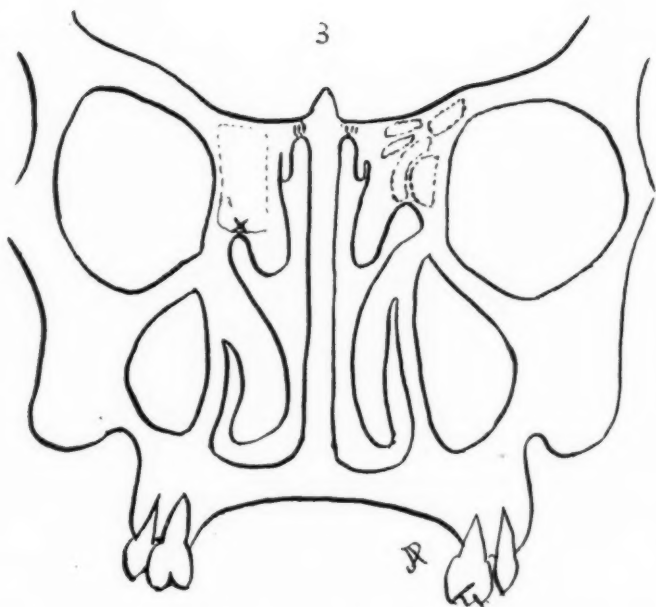
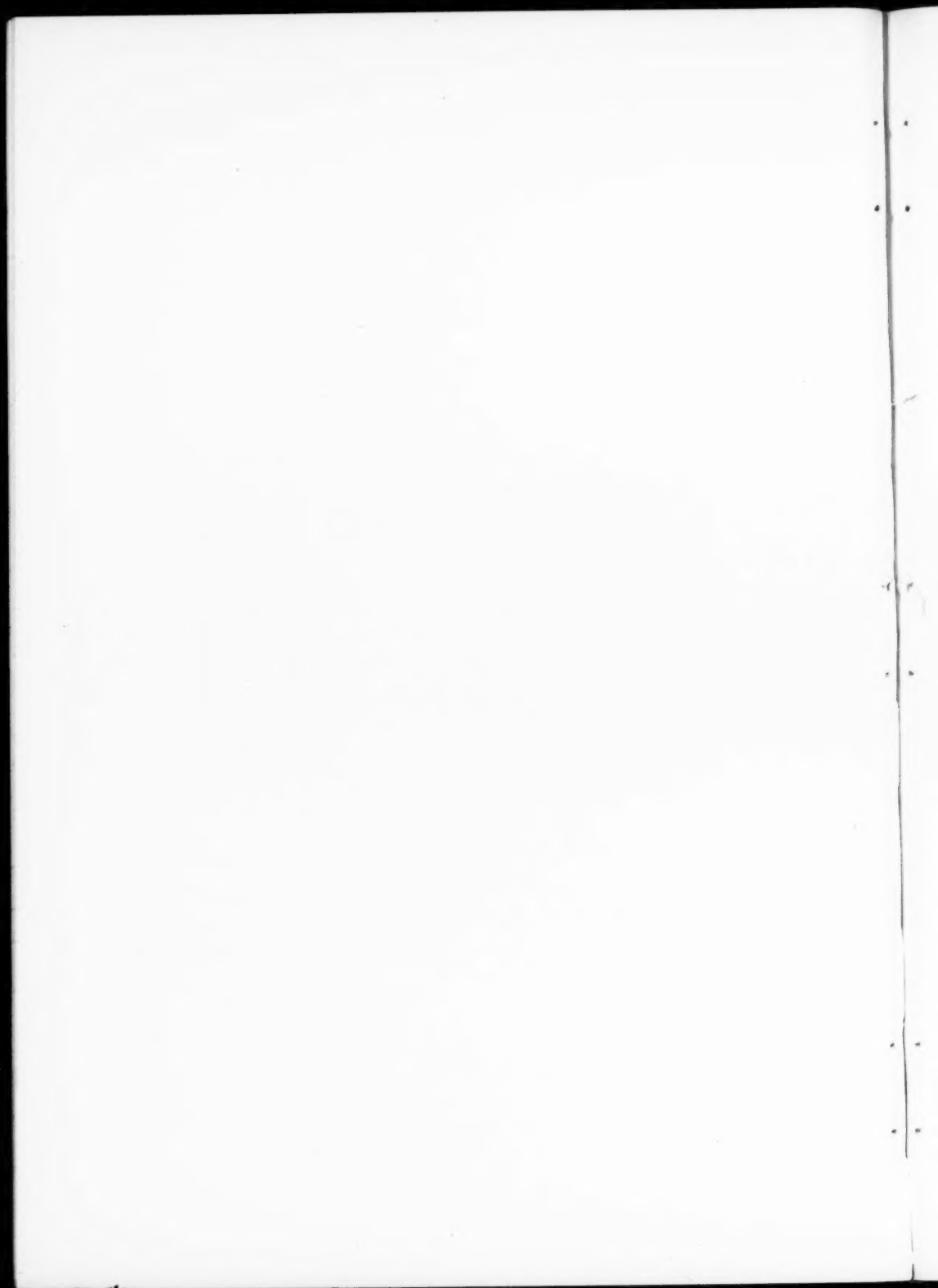


PLATE No. 3. DIAGRAMMATIC.

An oblique cut, showing the anterior ethmoid cells opened on one side and not on the other. The x shows the point of entrance under the anterior end of the middle turbinate. The drawing shows the position of the ethmoid capsule (outlined), how the hanging middle turbinate protects the cribriform plate during the exenteration.



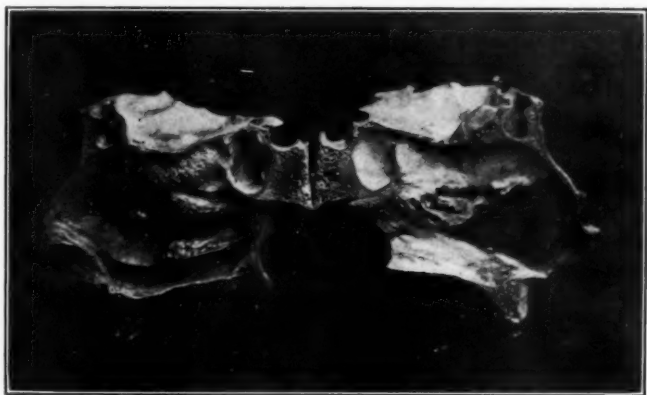
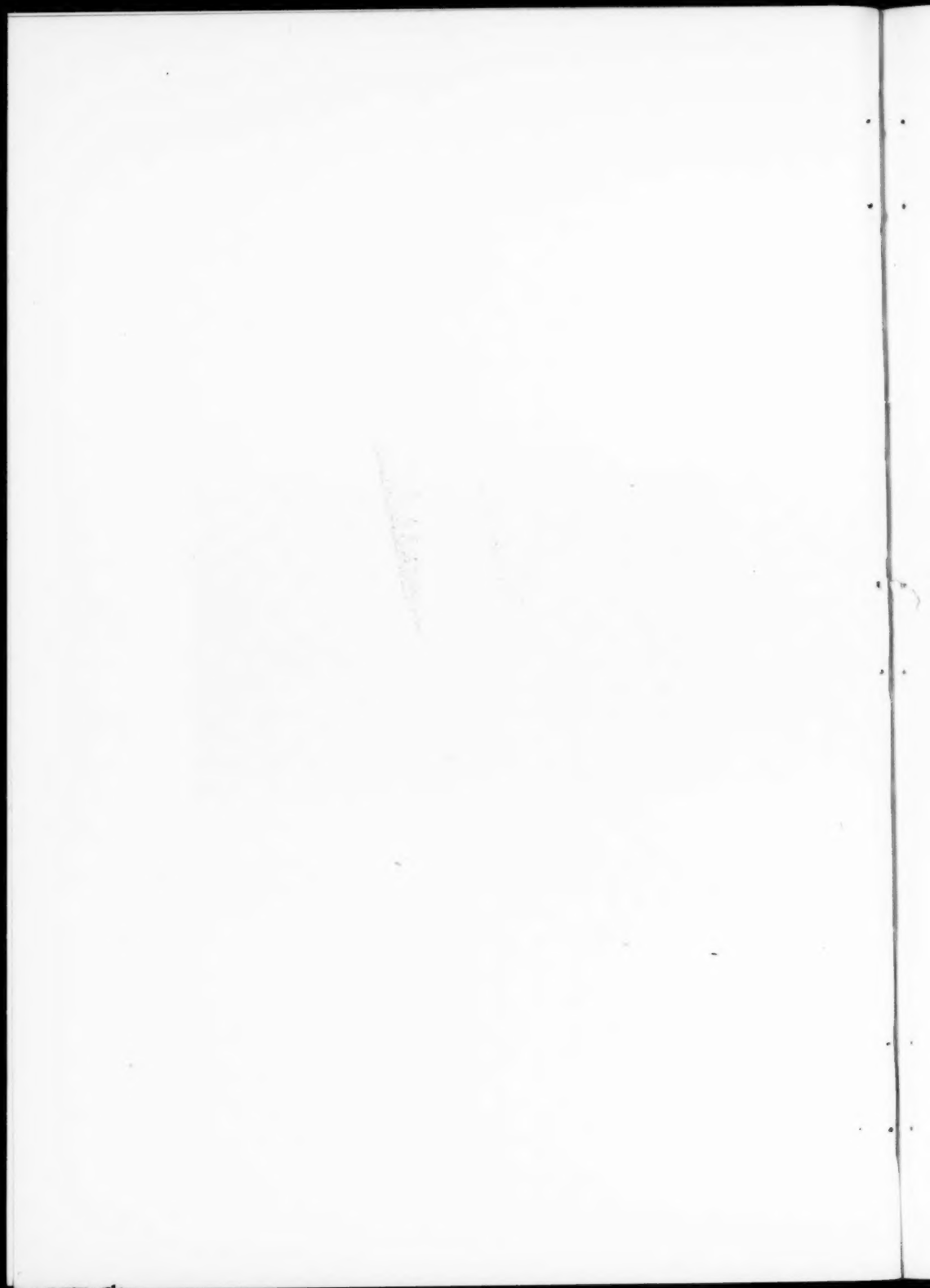


PLATE 4.

A specimen showing the middle and superior turbinates as a strong wall on the septal side of the ethmoid capsule. This operation does not interfere with any part of this wall. It also shows how directly back of the ethmoid capsule lies the sphenoid sinus.



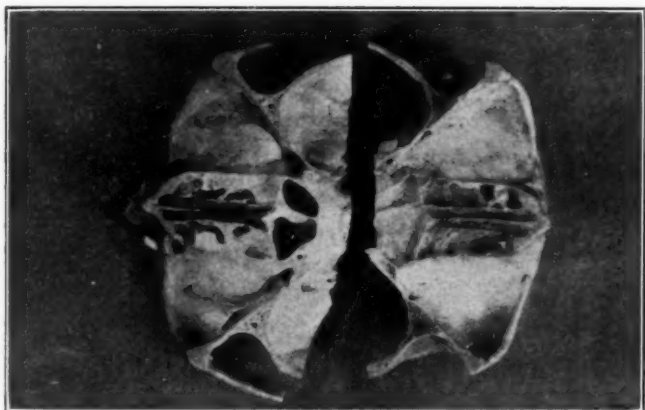
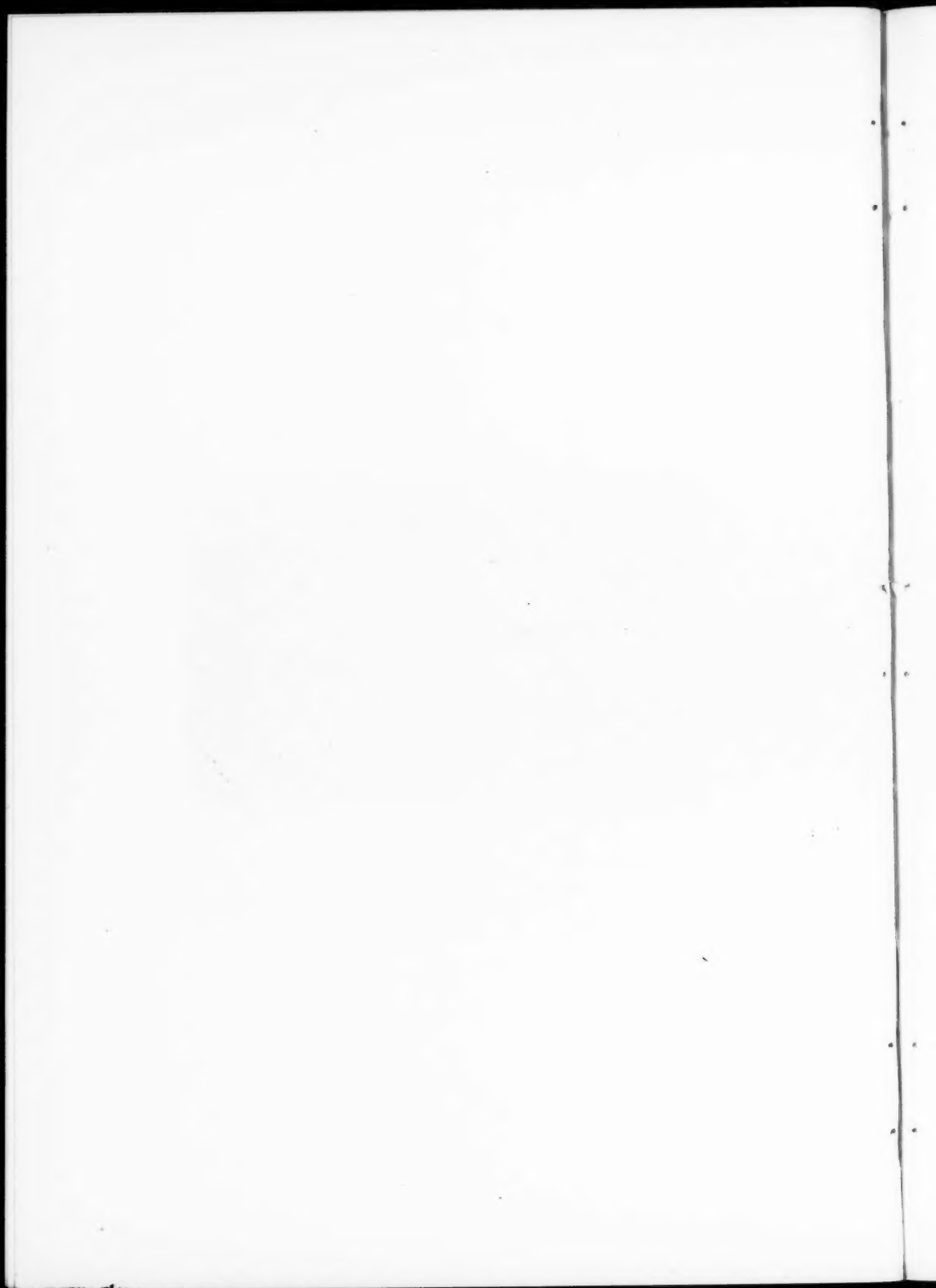


PLATE 5.

A specimen showing the anterior and posterior ethmoid and sphenoid sinuses in their position, and how they lie directly back of each other. The nasofrontal ducts are shown with an anterior cell in front of one of the ducts, the removal of which makes a wide opening into the frontal sinuses.



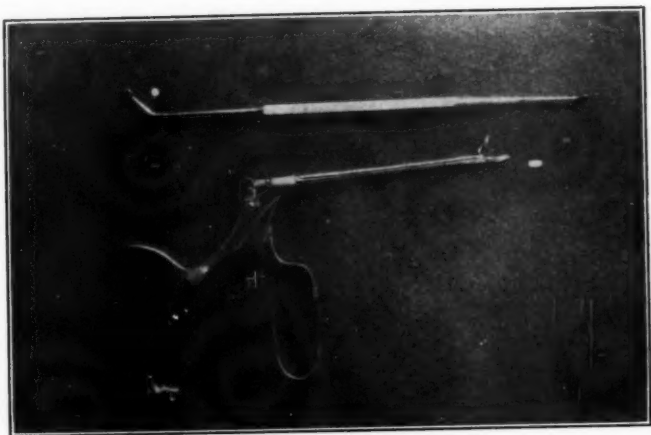
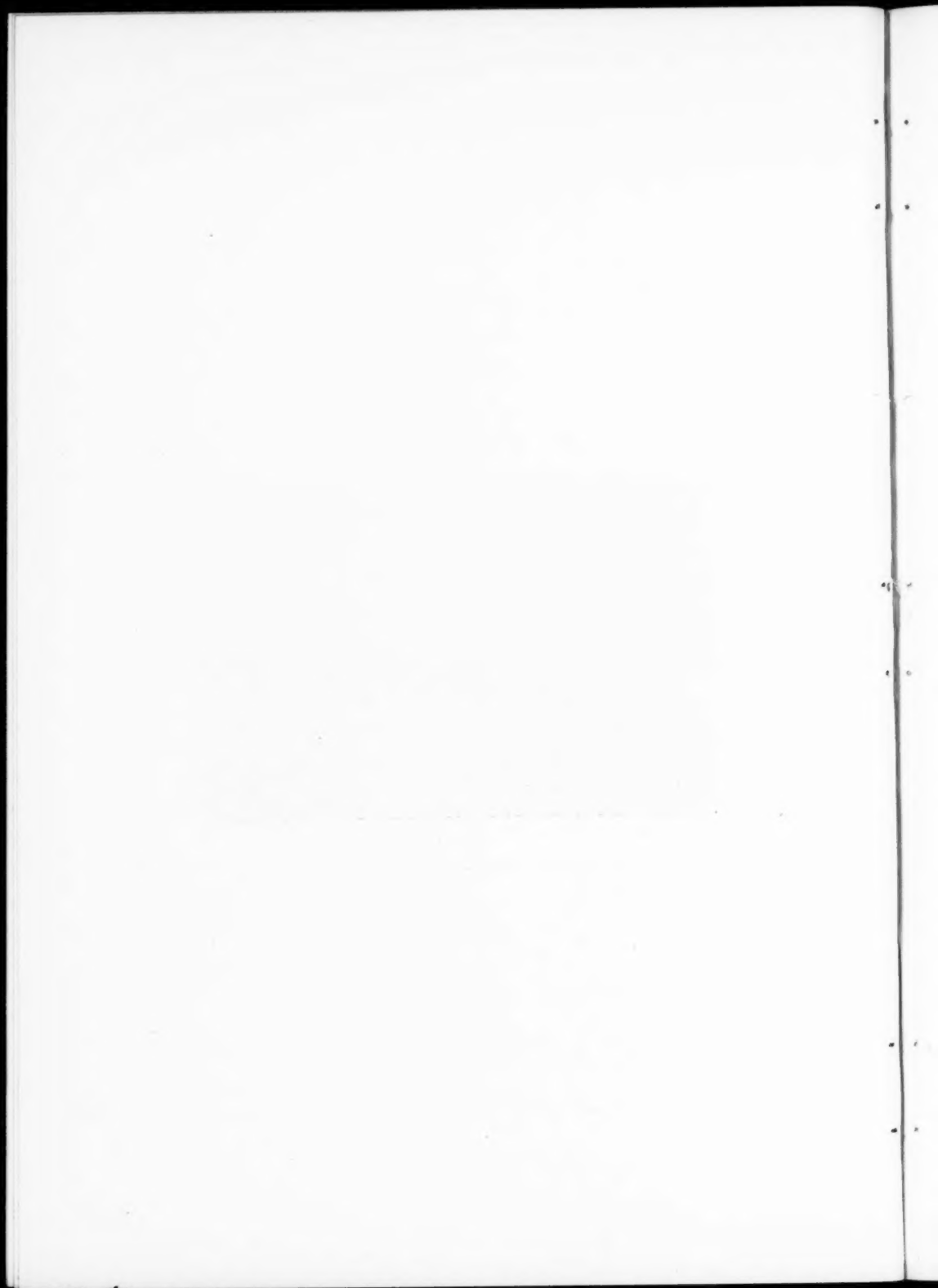


PLATE 6.
Instruments used in an ethmoid operation.



XLIX.

THE MALERUPTION INTO THE NOSE OF A LATERAL DECIDUOUS INCISOR.

BY V. BENJAMIN FISCHER, M. D.,

BOULDER, COLORADO.

Any individual practice in medicine is of value to the whole practice only in so far as that particular practice keeps case records that are available to this and every other generation. That there is nothing new under the sun is only true over a period of several decades. Everyone has had experiences which he shall never again meet; but, on the other hand, the experience unusual in the life of one individual is commonplace in the history of man. It is in the light of this fact that the following case is submitted:

Mrs. B., aged twenty-five years, complains of shooting neuralgic pains over and about the left eye. Trouble is always associated with occlusion of the left nostril. For instance, if she take cold and the left nostril swell shut, a thing that is particularly likely to happen, she will have a spell with her "neuralgia." She has had the trouble as far back as she can remember. Examination of the nose revealed a septum badly deflected, crumpled and spurred left to contact with middle and inferior turbinate. Membrane red, dry. Right nose patent, devoid of secretion. Inferior turbinate hypertrophic and septum concave. Under cocain and adrenalin ischemia, the middle turbinate area on both sides was visible, but revealed no evidence of trouble, secretion, polyp or hypertrophy. Endoscopic examination evidenced no abnormalities on the right, and in the left naris the instrument could only be inserted for a short distance above the inferior turbinate and spur. Family history was negative. There are two sisters and one brother, all of whom are living. Mother and father are both dead, one of apoplexy and the other recently of an acute illness, unknown. Past history is good. She has had none of the acute infectious diseases except a mild case of varicella. Denies scarlet fever, diphtheria, measles, pertussis, etc. Wassermann

is negative. In fact, she has never been confined to bed a day except when her two children were born. Had considerable teething trouble when a baby, and never erupted but seven deciduous teeth above. Mouth is small, palate vaulted, and teeth irregular.

Because of the head pain, even though neuralgic in character, an eye examination was advised with the following results: Under cycloplegic, hyoscin, vision, right eye 20/15; left eye, 20/15. Pupils round, equal, media clear, discs red, margin clear, cups shallow, narrow; vessel reflexes clear. A plus 3.00 D. lens gave near vision of No. 1 Jager type at 13", which result ruled out the possibility of eyestrain. Orthophoria for both distance and near, abduction 3 centrad, adduction 10 centrad.

I advised that her neuralgia was probably of nasal origin—at least, that in the presence of such a condition we would not be justified in any procedure that did not look to the nose first; and that, in my judgment, the correction of the septal deformity would at least improve her condition. A complete submucous resection was done. The nasal crest was gotten off with much difficulty, giving a clear view of the posterior naris on the left, a thing not possible before. However, with the crest off, the mucous flap refused to be retracted lateralwards, and the retracting instrument, when retraction was exerted to the maximum, encountered a bony-hard resistance along the floor of the nose through the mucous flap. In order better to inspect the area from which the resistance seemed to spring, the flap was retracted mesially, which procedure exposed a conical shaped projection springing from the floor of the nose in a vertical direction from behind the site of the incisor foramen. On percussion through the instrument the prominence was very hard and resistant and devoid of mucous covering. Cutting and biting instruments refused to take hold. A tentative diagnosis of malerupted tooth or exostosis was made and radiology resorted to for verification.

The radiographs, Figures 1 and 2, show the projection above the floor of the nose, also a pyramidal area of shadow projecting downwards into the substance of the palatal plate of the maxillary bone. Because an exostosis would not possess the pyramidal shadow below, it was felt that the diagnosis

of malerupted tooth could be considered with better favor. This assumption was further substantiated by the facts that the protruding mass was devoid of mucous covering and that the deciduous tooth (incisor) on the left had never erupted.

On such data the mass was diagnosed "a malerupted tooth." The nasal trouble, in all probability, arose from the deflection and spur, and the patient's condition was not likely to be affected either way by the tooth. But, on the other hand, the diagnosis could not be positively made without extracting the tooth. None of the dental instruments with which I was familiar could be operated in the nose; the rapid taper of the mass precluded snare wires and biting Hartman's, which simply skidded off of the apex without taking any hold. The task was similar to that of pulling out a carpet tack which had been driven snugly into the wood. The flat top of the tack offered no place for a hold, and the precipitous taper of the mass made it impossible to grasp it. Also, as in the case of the tack, if it were possible to get something in between the wall of the cavity and the root of the tooth, in the event that we were right in our diagnosis that the mass were a malerupted tooth, a gradual pry on the instrument would further open the cavity in which the root was imbedded and at the same time lift the root out. At least, on paper this was the way it seemed.

After several efforts and as many failures, an old jeweler's graver was obtained and the blacksmith instructed to bend it properly. At first the angle was not correct to get it into the nose; then the shank was too long to permit the rotation when it was in position, in relation to the mass.

The technic in using the tack puller was much as follows: The axis of the instrument was made coincident with the long axis of the mass, as nearly as it was possible to determine it. Then by bringing the instrument into contact with the mass the cutting edge was made to wear away the membrane and bone in the immediate vicinity of the neck. Thus was created a distinct depression, undermining the mass on the side, into which the tip of the instrument could be felt to drop as it came over the depression. With the point of the instrument in the depression, considerable pressure was made in the

direction of the point, and at the same time the instrument was made to rotate over the heel as a fulcrum. The result was not all that we had hoped for; for the mass, which proved to be a tooth, fractured through the root at a place below the neck; and, despite our subsequent efforts, which netted us additional fragments, the apex of the root was left in. However, the endeavor proved conclusively that the mass encountered was correctly diagnosed.

On the whole, the appearance of the tooth indicates an interrupted development. In size it is considerably smaller than the average deciduous incisor. The layer of enamel is somewhat thinner than usual. The dental canal is of the usual size, or larger, thus affecting very materially the wall of the tooth. Instead of an incisor edge, there is a sharp point from which there is a rapid increase in thickness toward the neck, and then a gradual thinning out toward the root. Figure 3 illustrates the tooth with the root, as much of it as was removed, reconstructed from the fragments.

In seeking out an explanation for its eruption into the nose, there are some data relative to the case that should be reiterated: namely, the failure of the left deciduous incisor to erupt, and the present irregularity of the mouth. The mother of the patient, as well as the patient, were insistent from the beginning, even before the tooth was suspected, that "her left front baby tooth never appeared." The contour of the mouth is cramped and the incisor area quite irregular from overlapping of teeth. If the present cramping of the palatal arch existed at a time when the dental buds were being laid down, it is quite possible that the regularity of their anlage was so disturbed as to produce just those conditions favoring the mal-eruption encountered here.

The mouth and nose cavities are one in early embryologic life. The floor of the forebrain ventrally and the wall of the pericardium dorsally form a wrinkle just below the eye stalks in the embryo. As the embryo grows longitudinally, the lips of this wrinkle separate to form a cavity, the stomatodæal space, from which the mouth, nose and lacrimal sacs ultimately differentiate. The stomatodæal space is shown in Figure 5, both front and side views. The maxillary process and globular processes are both shown. The dif-

ferentiation of the nose cavities and mouth occurs simultaneously. Above and ventrally there develop the globular processes, and below this and dorsally there develop the mandibular arches which fuse in front to form the mandible and from which, in an embryo twenty-seven days old, there has sprung a distinct tubercle on either side, the maxillary process. These, too, continue to grow in a ventral direction, and at two and one-half months have met in the mesial plane. In Figure 5 the globular processes and the maxillary processes are in apposition, thus completing the alveolar arch. The thickening of the epithelium to form the dental ridge, the first embryonic appearance of the tooth, has appeared prior to the conditions pictured in Figure 5, which shows conditions at two and one-half months. The dental ridge appears at the seventh week, and at two and one-half months the dentine papilla and enamel organ are laid down. At the time when the dental ridge is being formed, the alveolar process, comprising the globular and maxillary processes, is not complete. There remains for the completion of the alveolar process the lateral fusing of these embryologic elements and their projection and fusion backwards to form the hard palate. In the same fashion that the malfusion of these embryologic elements produces harelip, cleft palate, or both, depending upon the lack of fusion and the elements involved, so has it been possible in the present case for the globular process, in conjunction with the maxillary process on the same side, to misplace or misdirect a particular part of the dental ridge which ultimately developed our malerupted tooth. If, for instance, in the squeezing together of the globular and maxillary processes in this fashion to form the alveolar process, the tooth germ peculiar to this misplaced tooth became misplaced and inverted—not impossible happenings in the light of the embryology of cleft palate—the subsequent growth and eruption of the tooth into the nose was a natural result.

That the tooth is deciduous and not permanent is only conjectural. All of the front teeth erupted are permanent; so for the malerupted tooth to have been permanent there would need have been two permanent teeth from that tooth's germ. The contour and size of the tooth are of very little or no value in determining the character of the dentition.

The possible result was the occasion for much suspense. It

was feared that leaving this old root stump in the nose would occasion trouble. In the mouth, roots commonly infect the soft tissues, resulting in necrosis and ultimate exfoliation of the fragment. Such results in the nose might be dire. This, however, was not the case. Immediately after the operation the site was determinable by the scraping percussion note elicited by the steel instrument as it passed over the uncovered depression. At the end of a month the site was completely covered, either with granulation or new membrane; and there has been no complaint by the patient at any time. It was the subsequent disposal of the root stump, but the patient having moved away where X-ray advantages were denied her, this original intention to determine by means of radiographs the procedure was not possible.



Fig. 1.

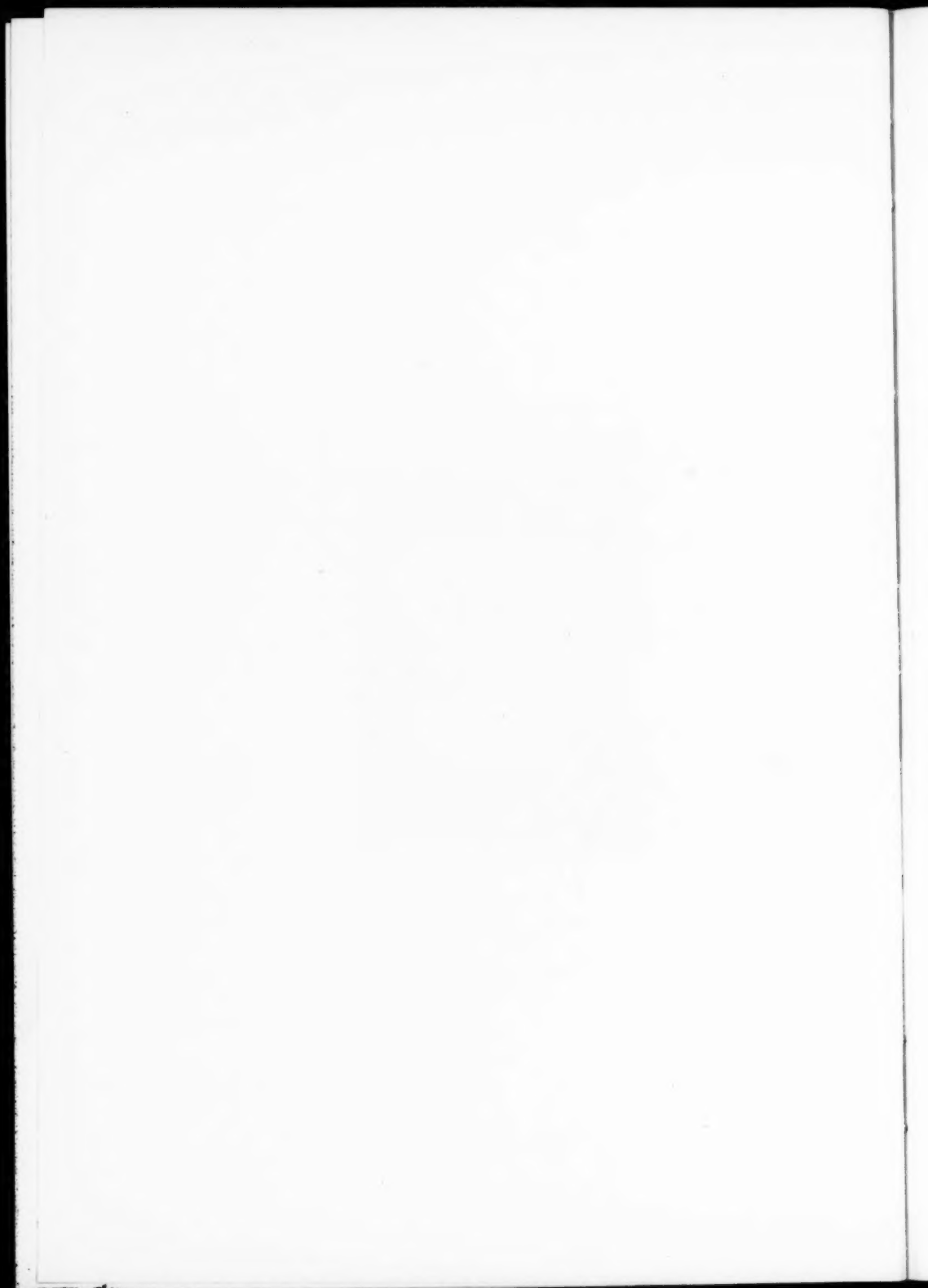




Fig. 2.

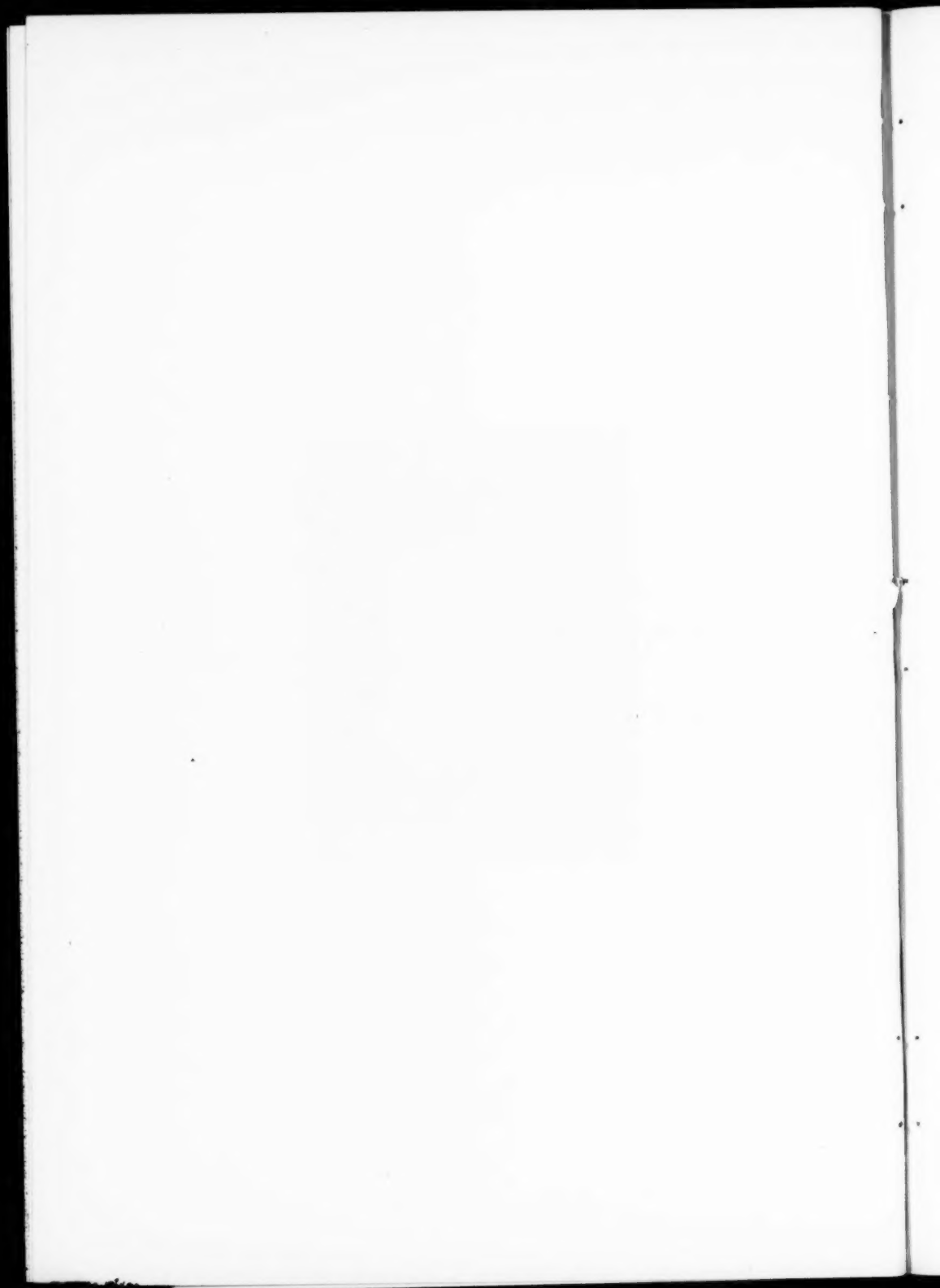
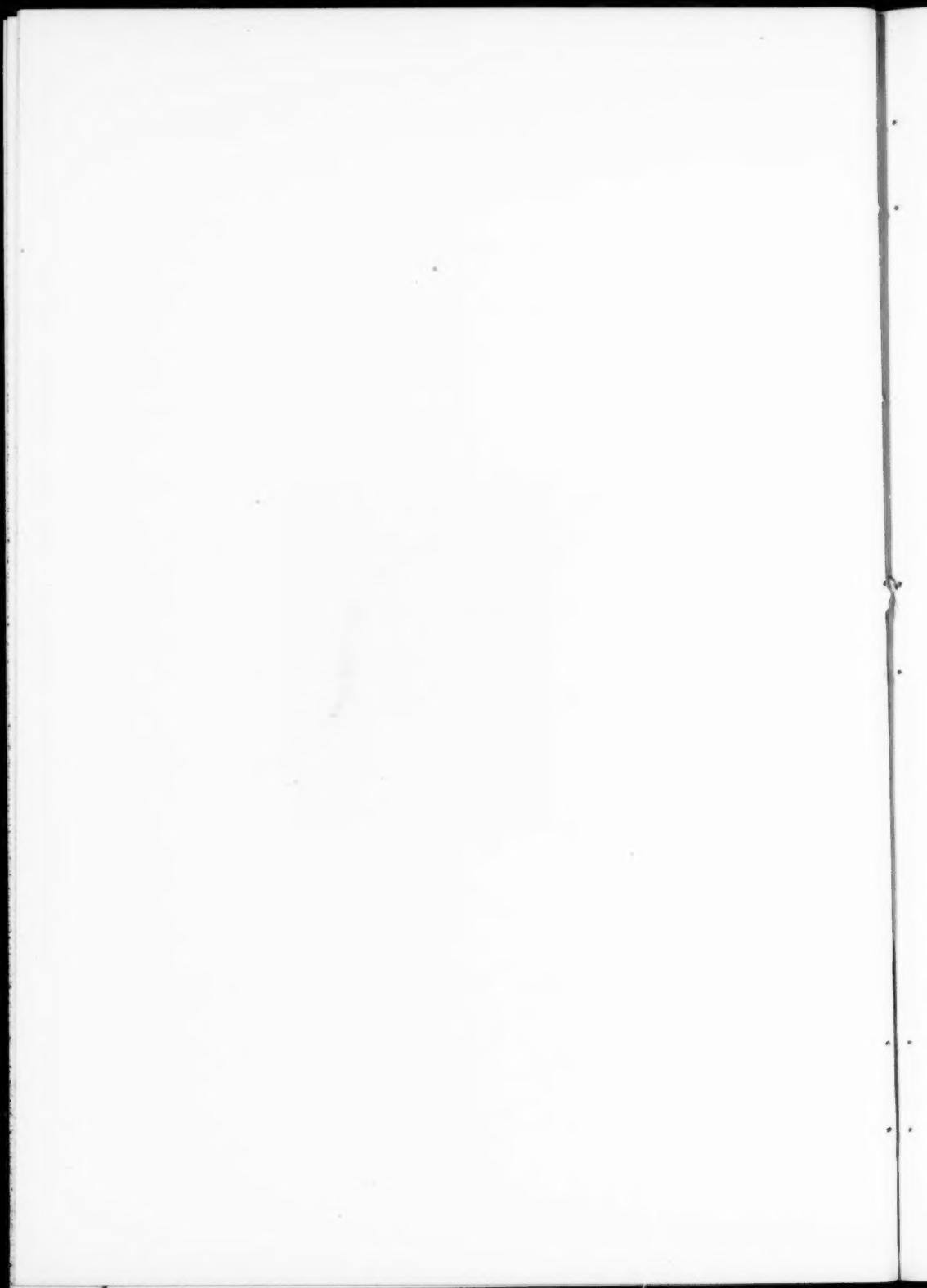




Fig. 3.



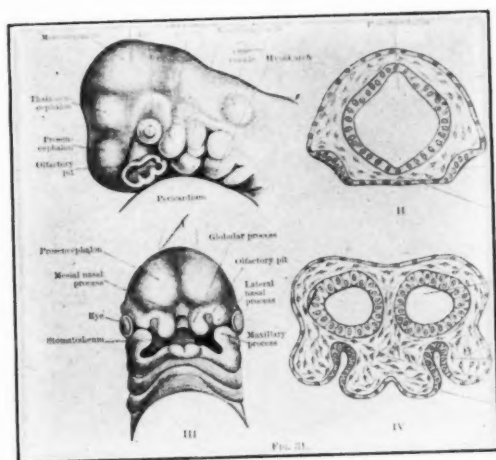


Fig. 4.

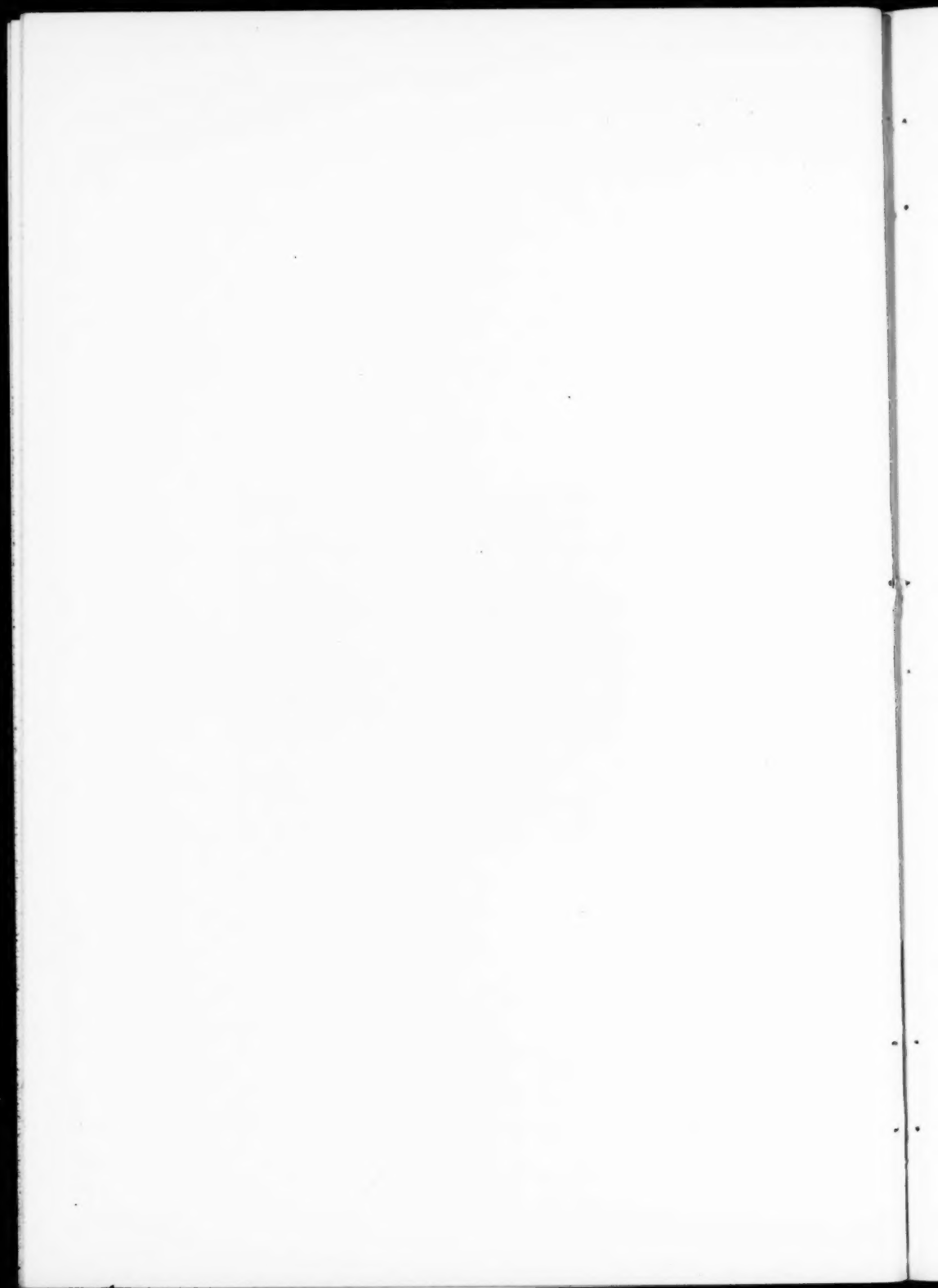
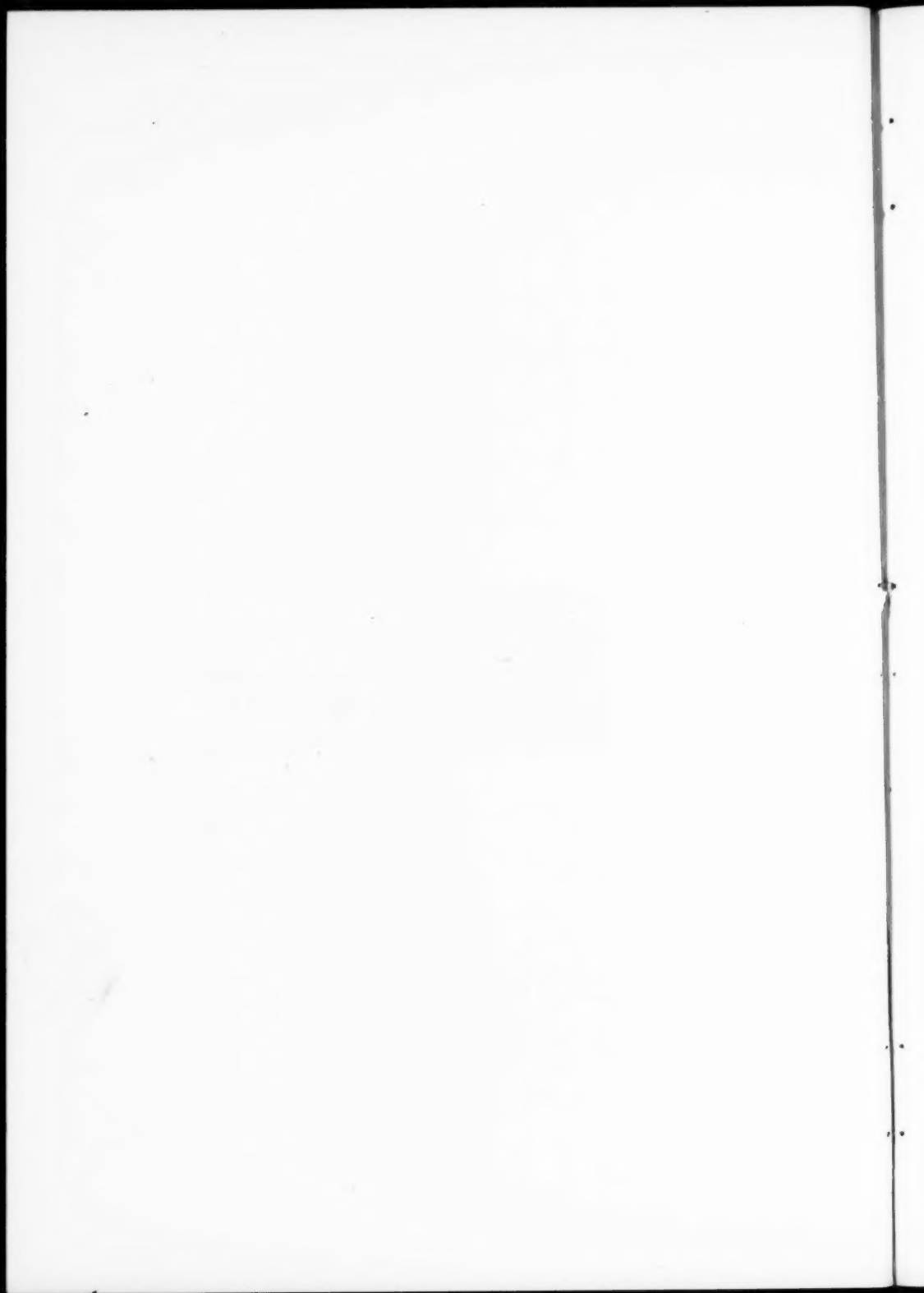




Fig. 5.



L.

REPORT OF A CASE OF OTITIS MEDIA SUPPURATIVE, CHRONIC, RIGHT, MASTOIDITIS; OPERATION FOLLOWED BY MENINGITIS, AND ON POSTMORTEM EXAMINATION, FINDING OF OLD ABSCESS IN THE TEMPOROSPHENOIDAL LOBE OF THE BRAIN.

By JOSEPH H. BRYAN, M. D.,

LIEUT. COL., O. R. C., U. S. ARMY,

WASHINGTON.

James B., private, Company 5, Second Train Engineers, was admitted to the Walter Reed General Hospital, July 25, 1918, complaining of a discharge from the right ear.

Family history good.

History of present disease: Seven years ago had earache, followed by discharge from the right ear. This condition cleared up and he remained well until about two months ago.

Objective symptoms: Aside from the purulent discharge from the right ear, there appeared no other essential disturbances. July 9th a small amount of granulation tissue was removed from the external auditory meatus, a swelling which appeared yesterday back of the auricle subsided, and the discharge from the canal was more profuse. The ear was ordered douched every three hours with hot normal saline solutions, and for several days there was no appreciable diminution in the quantity of secretion from the ear. August 16th, complained of pain in head, frontal and occipital regions, mentality very dull, meningeal involvement suspected, but this opinion was not concurred in by medical consultant. Eye-ground showed nothing abnormal on ophthalmoscopic examination, pain over mastoid with some swelling.

August 19th, the usual mastoid operation was done, and on removing the cortex of the mastoid the bone was found

densely sclerosed. Three distinct foci of pus were found, one near the tip, one in the outer angle, and one forward near the zygomatic cells. All diseased bone was removed and a fairly free opening made into the aditus, the wound dressed with gauze soaked in a solution of dichloramin-T in chlorococane. The patient was returned to the ward in good condition. August 21st, he passed a restless night, complaining of no pain, mentally not clear; temperature 103. August 22nd, mastoid dressing removed, cavity dry, but large quantity of pus on dressing coming through external auditory canal. Wound further explored but no diseased bone discovered. A large opening was made through the aditus to the middle ear. The dressing was reapplied. August 23d, general condition seems improved and mentally clearer; temperature still elevated. August 26th, passed a very restless night, complaining of pain in head, referred especially to the frontal and occipital regions. Today he is in a stuporous state—pupils react slightly, spasticity of neck and arms, marked Kernig on left side, patellar reflexes absent, no Babinski present, eyes showed no fundus changes, no choked disc. Lumbar puncture done; fluid found under moderate pressure turbid and streptococcus present. In consultation with the Chiefs of the Medical and Surgical services, the diagnosis of meningitis was confirmed and it was agreed that no further operative measures were indicated. August 27th, the patient died, 1 a. m. The temperature was normal until August 8th, when it rose to 103, again dropping to normal until August 15th, slowly rising to 103 for the rest of life. The pulse followed the temperature changes, ranging from 76 to 120, 160 at death. Respiration, 18 to 30; 50 at death.

Laboratory findings: X-ray, right mastoid cells obscured. July 27th, throat smear, no streptococcus present. August 24th, W. C. C. 20,200, 90 per cent neutrophilia, 10 per cent lymphocytes and transitionals. August 19th, discharge from right ear, yielded streptococcus hemolyticus. August 25th, secretions from mastoid yielded streptococcus hemolyticus.

The following is a report of the autopsy record as far as the brain is concerned:

Diagnosis: Purulent inflammation of pia arachnoid, mastoiditis, meningitis.

Specimen is a large, fairly well fixed unsectioned brain. Pia mater of the lateral and superior surface of the hemisphere deeply infiltrated by thick layer of greenish yellow gelatinous purulent exudate. This exudate is especially notable along the superior frontal convolutions and over the frontal lobes, where it extends deeply into the sulci. This exudate separates easily from the surfaces of the gyri, which are softened and evidence typical superficial cortical encephalitis. The subphial exudate is in some places 4 mm. in thickness, especially over the frontal lobes. The underlying veins are tortuous, congested with dilated lymph sheaths which are infiltrated by pus.

Membranes of the base are not so extensively involved but show moderate amount of thickening, infiltration and congestion, with underlying superficial cortical encephalitis with more extensive necrosis over the tips of the temporal lobes and along the gyri recti.

The membranes about the base of the cerebellum and pons are moderately adherent, matted together, slightly thickened, and contain pus pocket superior to the corpora quadrigemina lying within the valum interpositum, and extending laterally into the chroid plexuses of the lateral ventricles, especially on the right side, where it is continuous with an extensive abscess cavity reaching from the tip of the temporal lobe backward through two-thirds the length of the lobe and communicating with both the occipital and the temporal horns of the lateral ventricle, but separate from the anterior end of the temporal horn by a thin lamina of granulation tissue.

The walls of the abscess cavity are composed of soft, purulent granular material, containing occasional blood clots and masses of necrotic brain material. This granular hemorrhagic exudate has involved the ependyma of the above mentioned horns, especially the occipital, which presents a dull, slimy appearance. The lateral choroid plexuses are infiltrated by yellowish purulent material. The frontal horns of the lateral ventricles and the third ventricle also show an acute purulent ependymitis.

Basal ganglia and internal capsules are moderately hemorrhagic, edematous, and show beginning diffuse inflammatory changes.

MICROSCOPIC EXAMINATION.

1. Frontal cortex. The overlying membranes show moderate round cell infiltration with a few polymorphonuclear leucocytes about the walls of the blood vessels. The membranes as a whole are only slightly thickened. The deeper cortical vessels and also those of the white substance present greatly thickened and deeply infiltrated walls. This exudate is composed of fibrin, lymphocytes, plasma cells, and polys, involving mainly the tunica adventitia, which is closely packed with these cells. The white substance shows notable increase in neuroglia cells and mononuclear wandering types. In the cortex the ganglion cells are somewhat shrunken.

2. Temporal cortex. Sections from the left side show widely dilated perivascular lymph spaces. The pathologic changes in general resemble those of the frontal region except that they are somewhat less extensive.

On the right side, sections from the margin of the abscess are filled with pus cells, hemoglobin pigments, mononuclear wandering cells, numerous macrophages and areas of necrotic tissue loaded with cell debris. The polymorphonuclear elements predominate. The cortical structures are obliterated by exudate process. A few new formation capillaries are noted as well as a few strands of organizing fibrous tissue in all sections.

3. Precentral cortex. The blood vessels of the overlying meninges are dilated, filled with blood pigments and an increased number of white elements, and surrounded by numerous mononuclear cells. The meninges in general are only slightly thickened, and there are very few superficial cortical changes. The smaller cortical capillaries are especially prominent, and a large number of mononuclear cells are noted in all areas. All tissues appear edematous.

4. Cerebellum. Presents an active meningitis with also numerous chronic inflammatory elements accompanying the membranes deeply into the cerebellar fissures. Many of the meningeal vessels show fibrous thickening and some complete occlusion by fibroblasts.

The purkinian cells are reduced in number, the protoplasm is very pale, homogeneously stained. Nissl substance com-

pletely absent in some, leaving the nucleolus as the only prominently stained structure. The granular layer is notably reduced in width.

SUMMARY.

1. Acute purulent leptomeningitis, with chronic inflammatory cell infiltration.
2. Large temporal lobe abscess, with necrotic walls.
3. Secondary cerebellar changes.

NOLAND D. C. LEWIS, 1st Lieut. M. C.

BRAIN.

Brain weighs 1,490 grams. There was a considerable amount of turbid fluid beneath the dura. Looking at the base of the brain, the pia arachnoid in the region of the pons and medulla and adjacent portions of the cerebellum is very opaque in appearance, and between the medulla and both lobes of the cerebellum and extending in between the lobes of the cerebellum in that region is a distinct yellowish deposit. On the extreme outer portion of the left lobe of the cerebellum is a thick yellowish deposit. A thick yellowish deposit is seen at the extreme anterior part of the brain on the anterior face of the frontal lobes. In the fissure between the frontal and temporal lobes the pia arachnoid is distinctly infiltrated with a greenish yellow deposit. There is a distinct sinking in of the tissue of the posterior portion of the temporal lobe as the brain rests on its dorsal aspect, and on palpation the interior of the right temporal lobe is either a pus cavity or a mass of soft necrotic tissue. Looked at from its dorsal aspect, the vessels of the brain are all congested, as they are on the under aspect, and there are very distinct greenish yellow patches of exudate in the pia arachnoid involving the anterior and inner one-third of the frontal lobes. Back of the exudate on the frontal lobe on the left side, there is an irregular area of exudate about 60 mm. in length running along the longitudinal fissure and extending out laterally at its farthest point 40 mm. The exudate dips down on the mesial aspect of the hemisphere for a distance of about 15 mm. Further out on the left hemisphere is another irregular infiltration on the pia arachnoid of greenish yellow material having a general dimen-

sion of about 20 by 15 mm. On the right side of the brain is a similar exudate in the pia arachnoid, but it is only about one-half or one-third of the size of the one just described. The whole brain feels unusually soft, probably due to autolytic changes, as the body was kept for sixteen hours without being placed on ice.

BACTERIOLOGIC EXAMINATION.

Cultures from the turbid excess of fluid beneath the dura from the mastoid wound, from the two small loose fragments of bone mentioned above, from the clot in the lateral sinus and from the heart's blood yielded streptococcus hemolyticus.

A section of the temporal bone showed a small necrotic process in the roof of the tympanum, through which possibly the pathologic organism may have been transferred to the brain.

The abscess of the brain was probably an old one which gave no evidence of its existence during life. The meningitis was also probably present before operation and was lighted up by the operation on the mastoid.

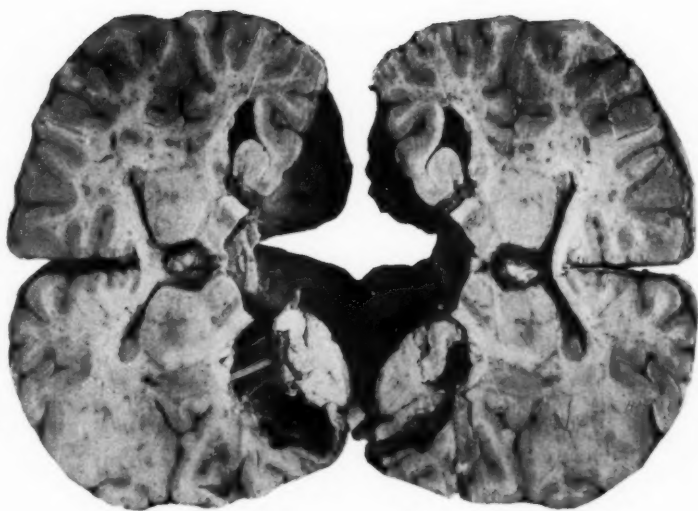
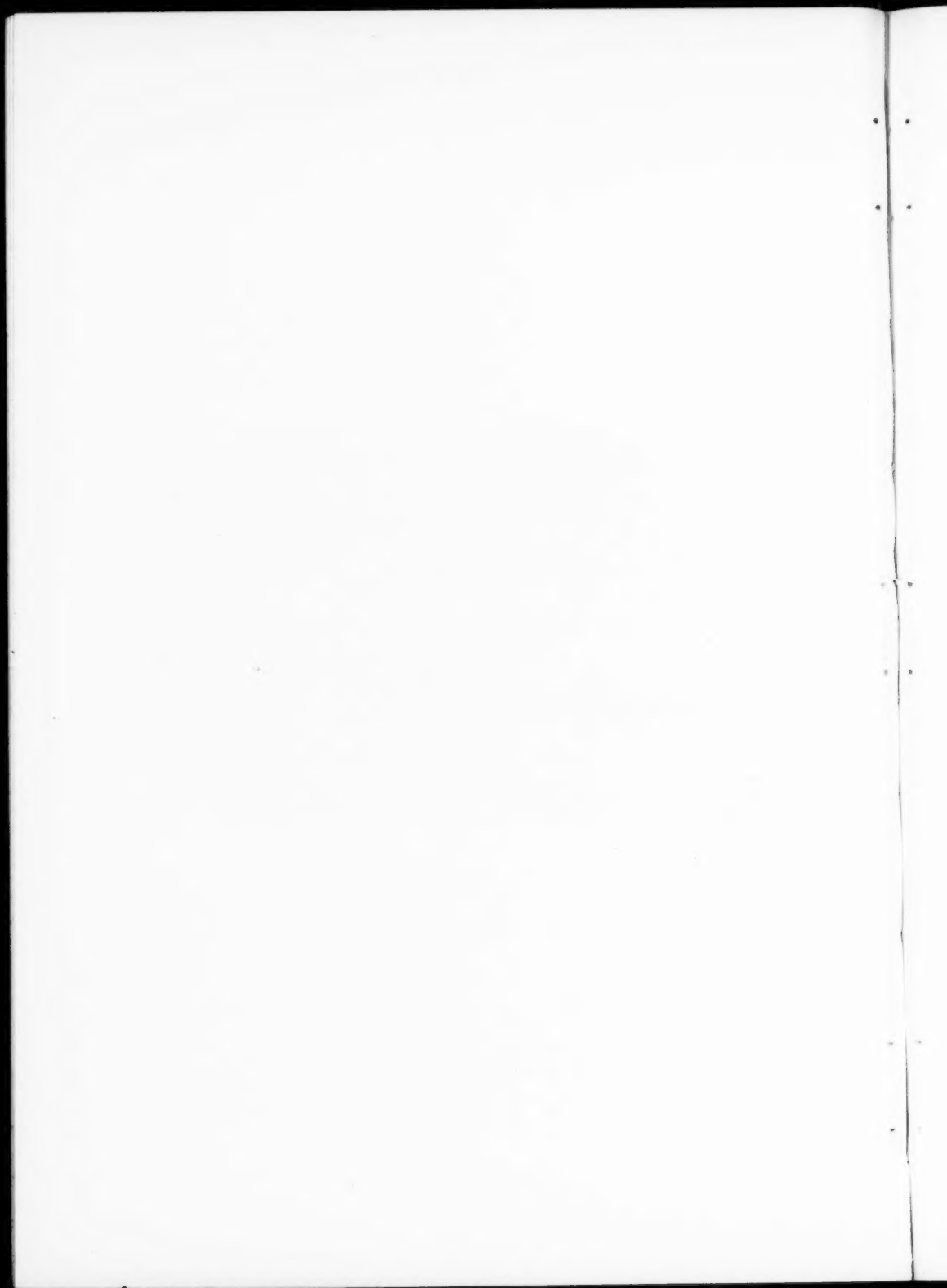


FIGURE 1.

A section of the brain showing seat of an extensive abscess in the temporosphenoidal lobe.



LI.

REPORTS FOR THE YEAR 1918 FROM THE EAR
AND THROAT DEPARTMENT OF THE ROYAL
INFIRMARY, EDINBURGH.

UNDER CARE OF A. LOGAN TURNER, M.D., F.R.C.S.E., F.R.S.E.
PART I.

THE COMPLICATIONS OF CHRONIC MIDDLE EAR SUPPURATION.
INDICATIONS FOR, TECHNIC AND RESULTS OF THE RADICAL
AND MODIFIED RADICAL MASTOID OPERATIONS; DE-
TAILS REGARDING THE LABYRINTHINE AND IN-
TRACRANIAL COMPLICATIONS OF CHRONIC
MIDDLE EAR SUPPURATION.

A Paper Based on an Analysis of 306 Cases of Chronic Middle Ear Suppuration, as follows: Radical Mastoid Operations [Ten Bilateral], 248; Modified Radical Mastoid Operations, 17; Labyrinthitis, 26; Intracranial Complications, 25.*

By J. S. FRASER, M.B., F.R.C.S.Ed., AND W. T. GARRETSON,
M.D., SALEM, IOWA, F.R.C.S.Ed.

This paper is a continuation of one written by Capt. Milne Dickie and the operator (J. S. F.),² or rather of the second portion of that paper (B), which deals with chronic middle ear suppuration and its complications. In the former publications seventy-eight chronic cases were reported, including nine fatal cases (11.5 per cent mortality). In the present paper 306 cases are dealt with and the fatal cases number sixteen (5.3 per cent mortality).

The cases now recorded include all those of chronic middle ear suppuration and its mastoid, labyrinthine and intracranial complications operated on at the Royal Infirmary, Edinburgh.

*Presented at a meeting of the Section, held February 21, 1919.

at Leith Hospital, and in private practice between 1911 and 1918—i. e., the chronic cases operated upon since the publication of the previous paper. The only cases not included are (1) five cases at the Royal Infirmary, of which the records have unfortunately been lost: none of these cases ended fatally. A case of temporosphenoidal abscess operated on six months before the war by an otologist who joined up at once. On admission the patient was suffering from septic edema of the brain and meningitis. The abscess was reopened (J. S. F.), but the patient died soon after admission. A second fatal case not included was one in which the patient suffered from chronic suppurative otitis media (right) with cerebellar symptoms. Autopsy showed that death was due to a cerebellar tumor on this side. (2) Fifteen cases operated upon at the Edinburgh War Hospital, Bangour. These included one recovery from purulent leptomeningitis and one death from metastatic abscess following septic thrombosis of the sigmoid sinus. Total chronic cases not included, 22, with three deaths.

RADICAL MASTOID OPERATIONS: 238 CASES (10 BILATERAL);
248 OPERATIONS.

Sex.—If the 238 patients, 118 were males and 120 were females.

Age (in decades).—1 to 9 years, 25; 10 to 19 years, 92; 20 to 29 years, 74; 30 to 39 years, 27; 40 to 49 years, 13; 50 to 59 years, 4; age not given, 3; average age, 20 years.

Residence.—Edinburgh and district, 104; country, 134.

Side of Operation.—Bilateral, 10 (i. e., 20 operations); right, 106; left, 122; total, 248 operations.

Cause.—The statements of the patients and their relations as to the causation of chronic middle ear suppuration are as a rule very unsatisfactory. Most of the patients have forgotten the date and origin of the discharge. The most common causes appear to be scarlet fever and measles. Not infrequently the aural discharge is attributed to a blow on the ear, but in many of these cases examination of the other ear reveals a dry perforation or a scar in the drumhead, and it is hard to believe that the school teacher, who is usually blamed, has struck the child first on one ear and then on the other and that chronic

middle ear suppuration has resulted on both sides. In only 66 cases did the patients or their relations remember the cause of the ear trouble, as follows: Measles, 26; scarlet fever, 25; pneumonia, 3; whooping cough, 1; mumps, 1; smallpox, 1; teething, 2; cold, 1; injury, 6.

As showing the distribution of chronic purulent otitis media and its complications between the wealthier and poorer sections of the population, it may be of interest to state that out of the 306 chronic cases operated on in the last seven years, and dealt with in this paper, only nine were performed in private practice.

On inquiry, the acting superintendent of the Royal Infirmary informed us that probably about 80 per cent of the population of Edinburgh and the Southeast of Scotland (from which the Infirmary mainly draws its clientele) would come to charitable institutions such as the Royal Infirmary for operations like the radical mastoid operation. According to this calculation 20 per cent of the cases instead of 3 per cent should have been operated on as private patients. It would thus appear that chronic suppurative otitis media is not only absolutely but also relatively more common among the poorer sections of the community than among the more wealthy.

If cases of severe acute suppurative otitis media were properly treated when they arise—e. g., in fever hospitals—there would be very little chronic middle ear suppuration, and consequently the radical mastoid operation would seldom be called for. Unfortunately, public health authorities have so far turned a deaf ear to the remonstrances of otologists in the matter. At the Seventeenth International Congress of Medicine in 1913, the Sections of Laryngology and Otology unanimously carried the following resolution: "That it would be greatly to the advantage of the community if experts in otology and laryngology were attached to the special hospitals for the treatment of epidemic diseases." The resolution was subsequently handed to Dr. Herringham, the General Secretary, by Mr. Arthur Cheate and Mr. Sydney Scott, and by him transmitted to the Permanent Committee of the International Congress.

Duration.—According to the statements of the patients, this varied from five months to twenty or thirty years. Here again

patients' statements were unreliable—e. g., several said that one ear had only been discharging for two or three weeks and denied that the other ear had ever discharged at all, and yet examination showed the results of old suppurative otitis media on the latter side.

Nose.—In 47 cases the condition of the nose was not noted. Of the remaining 191 cases, 63 were normal, 2 showed a dry perforation of the septum, 59 deviation of the septum, 29 acute or chronic nasal catarrh, 28 hypertrophic rhinitis and 6 atrophic rhinitis. One patient had nasal polypi and three suffered from maxillary antrum suppuration. Several of the patients who had deviation of the septum also had nasal catarrh or hypertrophic rhinitis. We had not systematically examined the maxillary antrum and other nasal sinuses in cases of chronic middle ear suppuration at the time of the radical mastoid operation, but we are surprised to note that Bodkin² finds that the antrum is infected in 93 per cent of cases and that one or both antra are full of pus in 16 per cent.

Pharynx.—In 55 cases the condition of the pharynx was not noted. In the remaining 183 the conditions were as follows: Normal, 87; slight adenoids, 21; enlarged tonsils, 25; enlarged tonsils and adenoids, 47 (24 of these had tonsils and adenoids operated upon before the radical mastoid operation). Three patients showed pharyngitis sicca.

Condition of Meatus and Membrane on Operated Side.—Of the 248 operated ears the condition of the membrane could not be seen in 129 instances on account of the presence of a polypus. In 10 cases the meatus was so full of cholesteatoma and so narrow in nine others that the membrane could not be inspected. One case showed hyperostosis of the meatus with a perforation in the lower part of the drumhead. Of the remaining 99 operated ears, 4 showed anterior perforations, 21 showed central perforations, 10 almost entire absence of the drumheads, 37 posterior perforations and 22 attic perforations. Five cases showed more than one perforation. Eighteen cases showed mastoid swelling or abscess and 3 a sinus over the mastoid, while in 6 cases there was a mastoid fistula. Eight patients had previously had Schwartze operations performed on the same side. Six patients had had radical operations performed once; one patient had had the radical oper-

ation performed six times and two others eight times on the same side before coming to the Royal Infirmary.

Condition of Meatus and Membrane on Nonoperated Side.—Of the 228 unoperated ears the condition of 13 was not noted. Normal, 52; evidence of eustachian obstruction, 34; acute suppurative otitis media, 2; chronic suppurative otitis media, 36; chronic suppurative otitis media with polypus or granulations, 12; attic perforations with granulations, 2. In 70 cases the membrane showed results of chronic suppurative otitis media; 6 had previously had mastoid operations performed on this side and 1 other case had also a labyrinth operation performed on this side.

Hearing Before Operation.—In testing the hearing before operation we have found that—speaking roughly—the conversation voice is heard at about three times the distance at which the whisper is perceived. Further, when the good ear is closed with the finger, a patient hears the conversation voice at double the distance he hears it at when the noise apparatus is placed in the good ear. In 16 of the patients the hearing was not tested—usually on account of the age of the patients; three other patients were deafmutes. Of the remaining 219 cases the deafness was severe in 95 (conversation voice at 1 foot or less); moderate in 83 (conversation voice at 1 to 4 feet); 33 had fair hearing (above 4 feet); 8 had good hearing (whisper at 6 feet). (Note: This classification differs from that given in the *Trans. Otol. Sect. Roy. Soc. Med.*, xii, No. 6, p. 33.)

Vestibular Apparatus.—This was tested in 206 cases. In the others it was omitted usually on account of the age of the patient. In cases with a large polypus occluding the meatus only the rotation test was as a rule carried out. Twelve cases showed only slight spontaneous nystagmus and one of these swayed slightly on Romberg's test. One patient showed a spontaneous pointing error. Four patients showed a fistula symptom, though in none of the four was a fistula found at operation. Normal rotation or caloric nystagmus was present in 140 cases. In 58 cases the reaction to the cold caloric test was delayed (in 10 of these cholesteatoma was present and in 28 the external meatus was partially blocked by a polypus). In four cases, one of them a deafmute, there was no reaction

to either test (none of these are included in the section on labyrinthitis).

Indications for Operation.—In several of the cases operated upon, one of the former clinical assistants, Dr. Andrew Campbell, had carried out intratympanic syringing according to the method employed by Siebenmann of Basle and Nager of Zurich. It was found that as long as this treatment was continued the discharge was slight or absent, but soon recurred when syringing was stopped. In several of these cases the subsequent radical operation showed that the attic, aditus and antrum were lined by cholesteatoma. In many cases more than one indication for operation was present. (a) Chronic suppurative otitis media and failure of conservative treatment, 33 cases. In this group 4 patients complained of giddiness and 1 of sickness. (b) Chronic suppurative otitis media with polypi or granulations, 93 cases: 11 of these complained of giddiness, 3 of sickness, and 1 patient showed facial paralysis. (c) Chronic suppurative otitis media with pain, mastoid tenderness and polypi, 57 cases: 9 of these complained of giddiness, 2 of sickness; 1 showed facial paralysis and 1 other showed stricture of the canal. (d) Chronic suppurative otitis media, acute exacerbation and subperiosteal abscess, 10 cases: In this group 1 patient complained of giddiness. (e) Chronic suppurative otitis media, posterior perforation, with or without cholesteatoma, 10 cases: 1 of these complained of giddiness and 1 showed facial paralysis. (f) Chronic suppurative otitis media, attic perforation, with or without cholesteatoma, 24 cases: in this group 6 patients complained of giddiness. (g) Chronic suppurative otitis media with a sinus over the mastoid, 4 cases. (h) Failure of previous mastoid operation, 17 cases. In group (h) 2 patients complained of giddiness and 1 other of sickness.

OPERATION.

Technic.—Since the publication of his paper on the technic of the radical operation in the *Journal of Laryngology* three years ago the operator has entirely given up the method of skin grafting there described and has adopted Mr. Marriage's method. In order to focus discussion on the question of

technic, we invite the opinion of the members on the following questions:

(1) We wish to ask whether, granted that the labyrinth is healthy, is it worth while to remove aural polypi on one or several occasions before proceeding to the radical mastoid operation?

(2) The value of preliminary radiograms of the mastoid processes: During the war it has not been possible to have radiograms taken of our mastoid cases owing to the absence on military service of the late Major Porter and Capt. Gardiner, who were in charge of this branch of Dr. Logan Turner's department.

(3) The line of incision—retroauricular groove or hair margin?

(4) Is it advisable to excise a crescentic piece of skin in order to brace the auricle up and back?

(5) Hemostasis: Is it advisable to adopt any method of local anesthesia—e. g., Neumann's, in addition to general anesthesia? Some American writers advocate the use of adrenalin during the course of the operation.

(6) Method of removal of bone by gouges, curettes or burrs, or by a combination of these three: Some American writers have much to say about necrotic bone found at the radical mastoid operation. In our experience real necrosis is very rare. In the walls of the cavity inflamed and softened bone is often met with, but actual necrosis and sequestrum formation almost never. Bone is very "recoverable" tissue.

(7) Methods of meatal plastic: At what period of the operation should the plastic be performed?

(8) Curettage of tympanic cavity: Use of forceps to remove granulations. Difficulty in dealing with granulations in the region of the oval window and sinus tympani. The operator has found Milligan's labyrinth spoon of service in turning small polypi out of the latter region.

(9) Removal of floor of bony meatus: Richards³ and Bowers⁴ recommend that this removal be so complete that the hypotympanic cavity is entirely exposed to view through the enlarged external meatus.

(10) Removal of convexity on anterior wall of bony meatus: Bowers apparently exposes the capsule of the tem-

poromaxillary joint in some cases in removing this convexity, in order to expose the eustachian tube for after-treatment.

(11) Method of dealing with the eustachian tube: Richards recommends removal of the processus cochleariformis and the tensor tympani so as to convert the muscular and tubal canals into one. Different types of curettes for the eustachian tube? Is it possible to remove all mucous membrane from this region, which, in many cases, includes numerous air cells? Bowers insists strongly on this point, though he admits that the internal carotid artery may be exposed. The jugular bulb also might be opened (J. S. F.). Yankauer claims that 83 per cent of tubes can be closed by curettage with his instruments through the meatus without radical operation, and that in 50 per cent of cases chronic suppuration is cured by this means. Longee, however, finds that only 8 per cent are cured. Unless we succeed in closing the tube at the radical operation we have got a mucocutaneous fistula, and any attack of nasopharyngeal catarrh is liable to be followed by otorrhea.

(12) Skin grafting: Before application of the graft the operation cavity is syringed out with warm sterile salt solution. Method of application—(a) on gauze or worsted packing, or (b) by filling the cavity with lotion and pipetting off the fluid from below the graft. Is it advisable to cut a small hole in the graft so as to leave the window regions exposed? We believe that, in the presence of a normal labyrinth, the hearing power after operation depends on the integrity of the window niches and the mobility of the structures closing the windows. It would appear possible that the skin graft might impair this mobility and also to some extent interfere with free access of air vibrations. Contraindications to skin grafting.

FINDINGS AT OPERATION (248 OPERATED EARS).

Superficial Tissues.—Normal, 207; edema, 2; glandular abscess, 2; subperiosteal abscess, 13; fistula, 10; scar, 14.

Mastoid Cortex.—Normal, 208; deep hollow over site of antrum, 6; cortex eroded, 5; eroded with granulations, 6; fistula, 10; old operation cavity, 13.

Mastoid Process.—Sclerotic, 174; sclerodiploetic, 31; diploetic, 12; cellular, 8; contained fibrous tissue, 15; fistula through

posterior meatal wall, 1; entirely hollowed out by cholesteatoma, 5; Bezold's abscess, 2.

Mastoid Antrum.—Practically healthy, 50; contained only watery, brownish or blackish fluid, 14; mucus or mucopus with swollen mucosa, 61; pus and polypoid mucosa and granulations, 57; contained cholesteatoma, 66.

Sigmoid Sinus.—In 202 cases the sinus was not exposed at operation. In 36 cases it was far forward (exposed by gouge) and found normal; in 2 cases it was exposed by gouge and appeared thickened; in 6 cases it was exposed by disease.

Aditus.—In 32 cases the aditus contained cholesteatoma; in 9 it contained granulations or polypi; in 7 the mucosa of the aditus was swollen and congested; and in 3 there was some growth of new bone.

Lateral Semicircular Canal.—The bony wall appeared thin and eroded, but showed no actual fistula in 8 cases; 1 of these cases showed the fistula symptom; 1 case (previously operated upon) showed new bone formation in the region of the lateral canal.

Ossicles (Malleus and Incus).—Under the conditions in which the radical mastoid operation is performed it is not possible to speak with certainty as to the condition of the ossicles in every case. After the bridge has been removed there is often so much bleeding that, even with the most careful swabbing, it is not humanly possible to observe in every case whether the incus and malleus are present. For this reason we do not wish to be dogmatic as to our findings, but with this reservation the following statement may be made: Both ossicles healthy, 74; malleus healthy but incus diseased (usually long process of incus eroded or absent), 74; malleus eroded and incus gone, 12; malleus and long process of incus eroded, 1; head of malleus eroded or absent and incus absent, 21; handle of malleus eroded and long process of incus gone, 2; handle of malleus eroded, incus healthy, 3; malleus and incus ankylosed, 6; ossicles absent or not found, 55.

Attic.—In 7 cases the attic showed swollen or polypoid mucosa; in 5 it contained granulations; in 53 cases there was cholesteatoma in the attic; in 1 case the attic was partly filled by new bone formation; in 1 case there was a small hole in the tegmen tympani; in 2 cases the facial canal was eroded.

Tympanum.—A note was made of the condition of the tympanum in 156 cases as follows: Swollen or polypoid mucosa, 28; granulations in tympanum, 44; polypus growing from promontory, 69; polypus from attic, 3; cholesteatoma in tympanum, 11; oval window filled by new bone formation, 1.

Tube.—In 246 of the 248 ears the tube was curetted; in two cases it was not curetted as it appeared to have been closed by a previous operation; in 9 cases the tube was curetted and touched with chromic acid. In 24 it was curetted and cauterised with the electro-cautery; (5 of this latter group did not report after operation; of the remaining 19 the cavity was satisfactory in 12, though 6 of the 12 required attention; in 2 the cavity was moist; in 5 the tube was still open).

Flap.—With regard to the flap, the operator continues to be satisfied with the results of the Koerner flap, which has been used in practically all cases.

Skin graft.—Mr. Marriage's method of skin grating was adopted by the operator in June, 1916, and since that time 83 of the operations recorded in this paper have been performed. Of these, however, only 70 have been skin grafted. The remaining 13 were not grafted for the following reasons: (1) The presence of fistula symptoms, 2 cases; in one of these the canal prominence proved normal but the stapes was probably loose; in the second case the bony wall of the canal looked thin. (2) Canal eroded, 1 case. (3) Exposure of the dura mater of the middle fossa, 4 cases. (4) Exposure of the middle fossa, giddiness, and abnormality of the canal prominence, 4 cases. (5) Sigmoid sinus exposed by disease and lateral canal eroded, 2 cases.

Progress.—Of the 238 patients 163 made uneventful recoveries. Seven cases had stitch abscesses. In 19 cases the posterior wound suppurated. In 3 cases the graft came away. Eleven had slight fever after operation, 13 had spontaneous nystagmus to the nonoperated side, 7 suffered from giddiness and nystagmus, 6 suffered from sickness and vomiting. Five patients after operation developed scarlet fever. The operator is of opinion that this "scarlatina" is, at any rate in some cases, a form of mild (probably streptococcal) septicemia resulting from the operation—i. e., it is not caught from another case of scarlatina in the usual way. One case developed erysipelas,

two cases showed slight swelling of the auricle and three developed perichondritis. There was no case of post-operative facial paralysis (i. e., paralysis present on the day after operation), but five patients developed facial paresis from five days to a week after operation; this trouble soon cleared up. One of the two patients who showed facial paralysis before operation was quite cured afterwards. Two patients developed purulent labyrinthitis after the mastoid operation and had double vestibulotomy performed. Both recovered. These two cases are dealt with in the section on labyrinthitis. Two fatalities followed the radical operation:

Case 1.—K. W——, female, aged 44, suffered from chronic suppurative otitis media and aural polypi, bilateral. Labyrinth healthy. First operation (radical mastoid on left side): Pus and granulations found with necrosis of ossicles; skin graft applied; aural polypus removed from right ear. Operated ear did well but discharge from right ear continued. Later, radical operation on right ear showed similar conditions to those on left side, sinus exposed with gouge but appeared normal, skin graft applied. Temperature rose continuously for three days after operation and patient had a rigor. Stitches removed and also skin graft. Patient developed a cough and blood stained expectoration; blood culture showed streptococcus. Intravenous injection of eusol given. Death. Postmortem: Old pleural adhesions, empyema of right side, large infarct in lower lobe of right lung. Cerebral sinuses showed no thrombosis.

Remarks.—This case appears to have been one of septicemia following the exposure of the sinus at the radical mastoid operation. The sinus was not injured and accordingly a skin graft was applied to the operation cavity. It is of interest to note that this patient appeared to have a presentiment of evil before the second operation, and insisted on making her will—a thing she had not done before the first operation.

Case 2.—R. S——, male, aged five, suffered from chronic suppurative otitis media, with acute mastoid exacerbation, enlarged tonsils and adenoids. Radical mastoid operation: Cholesteatoma present. Child fell out of bed on the day following operation and afterwards became unconscious. Operation wound opened up but nothing abnormal found. Lumbar

puncture yielded clear fluid under normal tension. Death on evening following operation. Postmortem refused. Cause of death uncertain—Status lymphaticus? Septicæmia? Acidosis? Injury to skull?

Mortality.—Mr. Heath claims a mortality of 1 in 360 and Mr. Adair Dighton of 1 in 54 for the modified radical operation. Mr. Dighton⁵ writes as follows: "In the chronic cases the risk to life in a Heath's operation is practically nil, whereas the radical mastoid operation boasts a death rate of at least 16 per cent. in these cases ("Report of Ear Department, Royal Infirmary, Edinburgh," March, 1912). We hold that this statement is calculated to give an entirely erroneous impression. If Mr. Heath and his followers intend only to plead for early operation in cases of middle ear suppuration, which do not yield to more conservative measures, few will be found to disagree. If, on the other hand, they wish to indicate that the modified radical operation is safe, whereas the radical mastoid operation is dangerous, we hold that they are misleading the medical profession. They must distinguish between the radical operation as performed in cases of middle ear suppuration alone and the same procedure when carried out en route to the relief of labyrinthine and intracranial complications already present when the patient is admitted. In the first case the radical operation according to our statistics in this paper has a death rate of 2 in 238 cases, or, if the 52 cases previously reported be included, of 2 in 290 cases. In the second case the mortality is admittedly severe but the fatalities cannot in fairness be attributed to the radical operation. If a patient with extrinsic cancer of the larynx has a preliminary tracheotomy followed by excision of the larynx, we do not attribute his death, should it occur, to the former procedure.

After-treatment.—It is almost superfluous to go back to the methods of after-treatment adopted before the days of skin grafting, according to Mr. Marriage's method. The writers have no experience with the Carrel-Dakin method, which seems to be associated with special difficulty in the after treatment of the radical mastoid operation. French writers have recommended ambrine—a form of paraffin, which is poured into the cavity and in which a wick of gauze is implanted to facilitate removal. This treatment is begun from the fifth to the

eighth day after operation, and is continued for fifteen or twenty days. Guisez recommends Vincent's powder (1 part calcium hypochlorite to 9 parts of boric acid), but again we have no experience with this method. Our own practice in cases which have been skin grafted is to pack the cavity with iodoform worsted at the time of operation and to leave the wound alone for five days. At the end of this time the stitches are removed, including that retaining the meatal flap. The iodoform worsted packing is also removed and the cavity mopped out with sterile gauze. The cavity is then repacked for a further period of two days with iodoform worsted and the dressings reapplied. Thereafter no further packing is employed, and the case is treated by means of syringing until the superficial layers of the graft come away and a dry cavity has, if possible, been obtained. The meatus is left open in the daytime but at night a piece of iodoform gauze is inserted, though the cavity itself is not packed.

The progress of the case after operation appears to depend to a considerable extent upon the general condition of the patient. The operator has noticed that the cases dealt with at the Edinburgh War Hospital, Banguor, have made better recoveries than those in the Royal Infirmary, and attributes this fact to the better physique and general health of the patients in the former institution.

Stay in Hospital.—The average duration of the stay in hospital after operation was twenty-two days. We have often felt that it is rather a waste of hospital space and of nursing skill to keep patients in hospital for several weeks after the radical mastoid operation. If the patient lives in town the question is easily settled, because he can come up once or twice a day for treatment. If, on the other hand, he lives in the country, the question is more difficult. If we send such a patient home we have to entrust the after treatment to a relation or friend who most probably has had no experience of ear work. The patient's doctor, even if he knows anything about after treatment, cannot afford the necessary time. We have often thought that it would be a good thing if, instead of retaining these patients in hospital, some less elaborate and expensive form of lodging could be provided near the Infirmary for country cases which require attention once or twice daily.

Aftercare of the Operated Ear.—Even after the case has apparently made a satisfactory recovery and the cavity has been completely lined with epithelium, some attention is necessary if things are to remain satisfactory. It is our experience that, unless the operation cavity is treated at regular intervals by means of peroxid drops and syringing with lukewarm soda solution, drying and the instillation of spirit and boric acid drops, wax and epithelium accumulate, so that in time the cavity becomes filled with puttylike material in which there is some pus. Printed instructions are now given to all "radical mastoid" patients on leaving hospital, but it is the exception to find that these instructions have been followed. As a rule the patients confess, when they report for inspection, that nothing has been done to their ears since they left the infirmary. In many cases the auricle and mastoid region have not even been washed with soap and water.

RESULTS.

We have found that accounts given by patients concerning the condition of their ears after operation are quite untrustworthy. When they returned to report some patients stated that their ears were quite dry and yet examination showed that discharge was still present. Others told us that their ears were still discharging, though inspection proved that they were quite dry. We accordingly decided not to send out a questionnaire and to depend only on personal examination of our operated ears. Sixty-three per cent. of the cases reported when written for. This is fairly satisfactory considering the difficulty and expense of travel in recent times.

The main point brought out by the examination of the patients who reported was that the persistence of eustachian catarrh or suppuration is the main source of failure after the radical mastoid operation. We have not as yet found an efficient method of closing the eustachian tube. The radical operation does appear, however, to free the patient from the danger of an intracranial complication. We know of no case in which such a complication has arisen after the radical mastoid operation has been performed. Dr. Logan Turner tells us that this is also his experience.

Results in the Nonskingrafted Cases (171) reported on by

Dr. Garretson.—Of 171 patients, 107 presented themselves for inspection at periods of from three months to five years after operation. Three of these 107 were patients who had had both ears operated upon, so that 110 of the 178 operated ears were seen. Of these, 37 appeared to be cured, while 10 others were very satisfactory except that they showed want of care (an accumulation of wax and desquamated epithelium). This gives 43 per cent. of cures. In 24 cases the inner wall of the cavity was moist, but there was no pus. There was still some purulent discharge in 27 cases. In 1 case the cavity was filled with cholesteatoma. In 3 cases a false membrane had formed, almost shutting off the deeper part of the cavity. In 4 cases there were granulations in the operation cavity. Three cases showed a permanent opening behind the ear. One showed a keloid in the mastoid scar and a large amount of debris in the cavity.

Hearing after Operation.—This was tested in 93 cases, as follows: Hearing improved, 35 (38 per cent.); the same, 36 (39 per cent.); worse, 22 (23 per cent.).

Results in the Skin Grafted Cases (reported on by J. S. F.).—Of the 67 patients, 44 presented themselves for inspection at periods of from three months to two and a half years after operation. Two of these were patients who had had both ears operated upon, so that 46 of the 70 operated ears were seen. Of these, 20 appeared to be cured, and 12 others were quite satisfactory except that they showed want of care (70 per cent. cures). In 7 cases the inner wall was red and moist. Four cases still had slight purulent discharge, and one other had foul smelling profuse discharge. Two cases showed membrane formation with a narrow opening through which pus came when the patient performed Valsalva's experiment.

If we add together the results in the nongrafted and grafted cases we get 156 operations with 79 cures, i. e. 50 per cent.

Hearing after Operation.—This was tested in 42 cases, with the following results: Improved, 12; as before operation, 16; worse, 6.

In the previous paper published by the operator and Capt. Milne Dickie it was noted that 26 of the 52 "radical" cases reported. Of these, 17 were dry, i. e. 65 per cent. The hear-

ing was tested in 22 cases, of which 15 were improved, 4 were the same, and 3 worse.

Results Obtained by Other Operators.—Bowers⁶ reports on 107 cases, 84 of which presented themselves for reexamination; 63 of these were dry (75 per cent. cures). The hearing was improved in 60 per cent., remained the same in 34 per cent., and was worse in 6 per cent. There were no deaths, but one partial facial paralysis.

Stucky⁷ reports on 100 cases with 89 dry ears. In the remaining 11 the tube was open and there was recurrent mucoid discharge. The hearing was improved in 19, remained the same in 60, and was worse in 21 cases.

Morisette Smith⁸ showed 10 consecutive cases with dry ears. The hearing was improved in 7 and remained the same in 3.

Dench has recorded 734 cases, with no death. He would be ashamed to show only 50 per cent of cures.⁹

Richards, in discussing Dench's paper, also holds that 50 per cent. of cures is a bad result and is due to inefficient operating. Speaking from memory, we believe that Dench and Richards claim from 70 to 80, or even 85 per cent. of cures.

On the other hand, Harris¹⁰ states that he has examined 24 cases operated upon by other American otologists, and of these 48 per cent. were dry and 52 per cent. were still discharging. The hearing was improved in 8 per cent., remained the same in 20 per cent., and was worse in 20 per cent.

It is needless to point out the divergence between the results claimed by Dench, Richards, Smith, Bowers and Stucky on the one hand, and those reported by Harris on the other. The writers are disposed to believe that the statements of Harris more nearly represent the results obtained by the majority of operators—at least before the days of immediate skin grafting—than do those reported by the group of otologists mentioned above.

We have attempted in the following table to associate the appearances present on otoscopy with the state of the hearing, conditions found at and the result obtained by operation. Although the numbers are small we have given the results as percentages for the sake of clearness.

MODIFIED RADICAL OPERATIONS.

Sex.—Of the 17 cases, 10 were males and 7 were females.

Age (in decades).—One to 9 years, 1; 10 to 19, 3; 20 to 29, 8; 30 to 39, 2; 40 to 49, 2; 50 to 59, 1. Average age, 26 years.

Residence.—Edinburgh and district, 11; country, 6.

Side.—Right, 10; left, 7.

Cause.—This was stated in 6 of the 17 cases, as follows: Scarlet fever, 1; measles, 3; teething, 1; mill accident, 1.

Duration.—As in radical operations.

Nose.—In 5 cases there was no note of the condition of the nose. Of the other 12 cases 4 were normal, 3 showed deviation of the septum, 1 showed hypertrophic nasal catarrh, and 3 showed both deviation of the septum and hypertrophic catarrh; 1 case had nasal polypi.

Pharynx.—In 4 cases the condition of the pharynx was not noted. Of the remaining 13 cases, 10 were normal and 3 had enlarged tonsils and adenoids.

Condition of Meatus and Membrane on Operated Side.—In two of the 17 cases the condition of the membrane could not be seen on account of the presence of a polypus. In 3 others the membrane could not be seen, in 2 owing to sagging of the meatal wall and in the other owing to meatal stenosis. Of the remaining 12 cases 1 showed central perforation, 5 showed posterior perforations, and 5 showed attic perforations; 1 showed a posterior and also an attic perforation.

Condition of Meatus and Membrane on Nonoperated Side.—Normal, 3; evidence of Eustachian obstruction, 7; chronic suppurative otitis media, 1; results of chronic suppurative otitis media, 5; meatus narrowed after an injury, 1.

Hearing before Operation.—Good, 2; fair, 8; moderate deafness, 6; severe deafness, 0; not tested, 1.

Vestibular Apparatus.—This was tested in 15 of the 17 cases; 14 cases showed normal reaction to caloric or rotation tests; the remaining case showed spontaneous nystagmus to the operated side and a well-marked fistula symptom on the operated side.

Indications for Operation.—What are the indications for the modified radical operation in cases of chronic middle-ear suppurative? Kaufman¹¹ states that the operation is indicated in

cases of disease confined to the antrum and mastoid in which the ossicles are in place. It is difficult to know, however, how he ascertains these data. It is usually considered that Heath's operation is indicated in cases with good hearing. In our experience such cases belong to one of two groups: (1) Cases with "central" perforation in the lower or anterior portion of the drumhead and with a mucopurulent discharge. These cases are really tubotympanic suppurations in which the upper and posterior portions of the middle ear cleft (attic, aditus and antrum) are not seriously involved. We believe that it is useless to open the mastoid antrum in such cases according to Mr. Heath's method. Even the radical operation itself with curettage of the eustachian tube too often fails to stop the discharge. We believe that the best treatment for this group consists in (a) attention to the nose and nasopharynx, especially the removal of a large "posterior end," operation for tonsils and adenoids, treatment of nasal accessory sinus suppuration if present, etc. (b) Syringing the eustachian tube through the eustachian catheter. (c) Syringing the tube by means of an ordinary metal ear syringe with an olivary end which tightly fits the meatus. The fluid passes down the tube and returns by the nose. Argyrol can be applied to the tube by these two methods. (d) Vaccine therapy.

(2) The second group in which hearing is often good consists of cases with attic perforations. In these, cholesteatoma is almost invariably present, and we understand that Mr. Heath at one time regarded cholesteatoma as a contraindication to his operation. If this is still so, we cannot agree with Mr. Heath's view, for we have operated on several cases of attic perforation with cholesteatoma in which a modified operation yielded a perfectly dry ear with the retention of excellent hearing. In these cases the external wall of the aditus and attic were removed, but the lower portion of the drumhead along with the ossicles were not touched.

(3) The only remaining group of chronic middle ear suppuration is that in which there is a perforation in the posterior portion of the drumhead extending to the margin. In many of these an aural polypus is also present. We have found that in the majority of these cases the long process of the incus is absent so that the continuity of the ossicular chain is broken.

The hearing is often poor, but if it is good the modified radical operation should be performed.

Our usual indication for the modified radical in preference to the radical operation was the retention of (1) good hearing in the operated ear or (2) moderate hearing when the other ear was distinctly deaf.

Technic.—As in the radical operation up to the point at which the inner end of the bridge remains. Koerner's flap is then cut and any polypus in the meatus removed with forceps. If an attic perforation is present the inner end of the bridge with the outer attic wall is removed. Special care is necessary to get away all bone chips. Marriage's skin graft is applied to the antrum in the majority of cases.

OPERATION.

Superficial Tissues.—Normal, 13; scar from accident, 1; scar from old operation, 1; subperiosteal abscess, 2.

Mastoid Cortex.—Normal, 14; eroded, 2; old operation cavity, 1.

Mastoid Process.—Sclerotic, 11; cellular, 5; scar tissue, 1.

Mastoid Antrum.—Healthy, 3; contained only watery, brownish or blackish fluid, 2; mucus or mucopus with swollen mucosa, 6; pus and polypoid mucosa and granulations, 3; contained cholesteatoma, 3.

Sigmoid Sinus.—In 5 cases the sinus was far forward (exposed by gouge) and found normal. In no case was it exposed by disease.

Progress.—Of the 17 patients 9 made the uneventful recoveries. Two cases had stitch abscesses. In 2 cases the posterior wounds suppurated slightly. One patient had slight nystagmus to opposite side and another had rotatory and lateral nystagmus to the affected side on the day following operation. One patient had slight fever and some swelling of the auricle, but no redness, and the condition soon cleared up.

RESULTS.

Twelve of the 17 patients reported after operation. Of these, 9 were quite satisfactory. In 3 cases the cavity was still moist.

Hearing after Operation.—This was tested in 12 cases, as follows: Improved, 10; as before operation, 1; worse, 1.

We have attempted to associate the appearances present on otoscopy with the state of the hearing, the conditions found at and the result obtained by operation. The cases have been divided into the following groups:

(1) There was a central perforation in 1 case, with moderate hearing, and the antrum contained only mucus. The meatus was still moist five months after operation.

(2) In 5 cases the perforation was in the posterior superior part, and in 3 of these a polypus was also present. In 1 of the 5 the hearing before operation was good, in 3 it was fair and in 1 moderate. The antrum was practically healthy in 1 case. In a second it contained only brownish fluid. The third contained mucopus. In the fourth there was pus and polypoid mucosa, and in the fifth cholesteatoma. The result is known in 4 of the cases, and in all of these the ear was dry. The hearing was improved in 2 and remained the same in 1 case.

(3) An attic perforation was present in 6 cases, in 2 of these combined with the presence of polypus or granulations. The hearing was good in 1 of the 6 cases, fair in 4 and moderate in the remaining 1. The antrum was healthy in 1 case, but the attic contained cholesteatoma. The antrum contained discolored fluid in 1 case. In 2 the antrum contained mucopus and in 2 cholesteatoma. The result is not known in 2 cases. The ear remained moist in 2 cases, while in the remaining 2 the ear was dry. Of the 4 cases who reported, the hearing was improved in 2 cases, remained the same in 1 and was worse in 1.

(4) In 1 case the meatus was stenosed, so that the position of the perforation was not ascertained. Hearing was not tested. The antrum was healthy. The result as regards condition of the cavity was excellent.

(5) In 2 cases there was sagging of the posterior superior wall of the meatus, preventing inspection of the membrane. In 1 of these the hearing was fair and in the other moderate. In both cases the antrum contained pus and polypoid mucosa. One case did not report, but in the other the ear was dry and the hearing improved.

(6) In the two remaining cases the meatus was occluded by a polypus and the position of the perforation not ascertained. In 1 of these the hearing was good and in the other moderate. In both the antrum contained only mucopus. One patient did not report, but in the other the result was good and the hearing improved.

LABYRINTH CASES.

The labyrinth cases numbered 26, 16 of whom were males and 10 females. The age of the patients varied from 5 to 53 years—as a rule between 20 and 30. It is notable that the average age (25) was considerably more than the average age (19) of the intracranial cases. Eleven of the patients resided in Edinburgh or its neighborhood and 15 came from the country. Cholesteatoma was present in 13 of the 26 cases; granulations and polypi in 21 cases. In 3 cases there was an attic perforation and in 2 cases a posterior marginal perforation could be seen. A subperiosteal abscess was present in 5 cases and facial paralysis before operation in 3.

Symptoms.—Pain in the ear or head, 18 cases; fever in only 2 cases; giddiness, 16 cases; vomiting, 8 cases. Noises in the head formed a marked symptom in 1 case and were so bad that the patient insisted on operation.

Hearing.—Not tested in 2 cases owing to the age of the patients. In none of the remaining 24 cases was the hearing good. Moderate hearing (conversation voice at from 1 to 4 feet) was present in 4, and severe deafness (conversation voice at less than 1 foot) in 8 cases. Total deafness in 12 cases.

Vestibular Symptoms.—Spontaneous nystagmus, 8 cases; pointing error, 2 cases; fistula symptom present in only two instances, although there were 12 cases of circumscribed labyrinthitis. Rotation nystagmus was normal in only 3 of the cases, while it was reduced in 11. In the others it was not tested. Caloric nystagmus was not obtained in 13 cases in which it was examined for. Many of these, however, had cholesteatoma and polypus. Caloric nystagmus was present in 9 cases of circumscribed labyrinthitis.

TYPE OF LABYRINTHITIS, OPERATION PERFORMED AND RESULT.

(a) Of the 26 patients 12 were cases of circumscribed labyrinthitis. In 10 of these the radical mastoid operation only

was performed, and 3 of them were skin grafted. All of the patients recovered. In 4 of the 10 the hearing was improved, in 3 the hearing remained the same, in 3 the hearing was not tested after operation. In one of the remaining cases double vestibulotomy was performed in addition to the radical mastoid operation. The patient recovered but had no hearing on the operated side. In the last case Neumann's labyrinth operation was performed in addition to the radical mastoid operation. This patient recovered, but was also deaf on the operated side.

(b) Diffuse purulent labyrinthitis (manifest)—3 cases—following the radical mastoid operation. In 2 of these a fistula was present in the lateral canal at the time of the radical operation. In 1 case the radical mastoid operation alone was performed. The patient recovered with loss of hearing. In 2 cases vestibulotomy was done when the patients developed labyrinth suppuration. Both patients recovered, with loss of hearing.

(c) Latent labyrinth suppuration, 8 cases; in 6 of the 8 cases the radical mastoid operation and double vestibulotomy were performed. All 6 patients recovered but with the total loss of hearing. In 2 cases the radical mastoid operation, plus Neumann's operation, was performed. One of these patients recovered and 1 died.

(d) Spontaneous cure of labyrinth suppuration, 2 cases. In both of these the radical mastoid operation only was performed. Both patients recovered.

I. Otoloscopic appearances.	Total	II. Hearing before operation. (Percentages.)						III. Condition of antrum at operation. (Percentages.)						IV. Result of operation (Percentages.)						V. Hearing after operation. (Percentages.)			
		(1) (2) (3)			(4) (5) (6)			(1) (2) (3)			(4) (5) (6)			(1) (2) (3)			(4) (5) (6)			(1) (2)		(3) (4)	
		(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)
Anterior perforations.....	4	—	50	—	50	—	—	75	—	—	25	—	—	25	—	—	25	50	—	—	50	—	50
Central perforations.....	21	5	14	33	29	19	5	5	43	33	14	14	33	33	19	19	10	19	14	24	24	24	38
Posterior perforations.....	38	3	18	53	23	3	21	6	37	13	23	18	34	8	18	13	27	29	18	11	42	11	42
Attic perforations.....	22	9	36	27	23	5	18	5	14	9	54	27	36	14	18	9	23	5	14	50	31	40	31
Multiple perforations.....	5	40	—	—	60	—	—	—	20	40	40	40	40	—	40	20	—	40	20	—	40	40	40
Total loss of drumhead.....	10	—	10	20	50	20	40	20	—	—	10	30	30	30	—	50	—	20	—	30	10	60	60
Drumhead not seen.	100	6	21	35	30	8	20	6	27	18	29	21	32	12	21	10	25	16	20	23	41	—	—
Polypus without cholesteatoma.....	122	2	10	33	44	11	20	6	22	30	22	10	26	12	16	11	35	30	19	10	41	—	—
Polypus with cholesteatoma.....	7	—	14	29	57	—	29	—	—	14	14	43	29	14	14	29	29	14	42	29	—	29	—
Cholesteatoma blocking meatus.....	10	—	40	10	50	—	20	—	20	10	50	20	40	20	20	—	30	50	30	10	30	10	30
Stenosis of meatus.....	9	—	22	22	34	22	22	—	—	34	—	44	11	34	11	11	22	22	22	11	11	56	56
Total.....	148	2	13	30	45	10	20	5	23	26	26	11	27	13	17	11	32	30	20	9	41	—	—

III. Condition of antrum at operation:

- (1) Antrum healthy.
- (2) Bony walls healthy; antrum contained watery fluid.
- (3) Antrum contained mucopus, or the mucosa was swollen or congested.
- (4) Pus or granulation tissue present.
- (5) Cholesteatoma.
- (6) In these cases the antrum was practically healthy, while the aditus or attic contained cholesteatoma.

IV. Result of operation:

- (1) Good hearing (whisper at 6 ft.).
- (2) Fair hearing (C.V. 4 to 12 ft.).
- (3) Moderate deafness (C.V. 1 to 4 ft.).
- (4) Severe deafness (C.V. 1 ft. or less).
- (5) Not tested.

V. Hearing after operation:

- (1) Good result; operation cavity dry.
- (2) Cavity satisfactory, but showed want of care.
- (3) Cavity moist; tube open with mucoid discharge.
- (4) Poor result; pus present with granulations or false membrane formation.
- (5) No report.

V. Hearing after operation:

- (1) Hearing improved.
- (2) Hearing same as before operation.
- (3) Hearing worse.
- (4) Hearing not tested after operation.

Details of two fatal labyrinth cases:

Case 3.—W. A——, male, aged 5. Admitted March 6, 1913. C. O. M. S., right, for two years. Pain and swelling behind right ear for two days. Patient is stated to have pulmonary tuberculosis. Temperature 100°F., pulse 118. Total deafness in right ear. No spontaneous nystagmus or Rombergism. Cold caloric reaction absent on right side. Radical mastoid and labyrinth operation; antrum contained pus; lateral canal prominence flat and reddish; fistula into cochlea; promontory softened; dura of triangular area exposed and separated from posterior surface of petrous; free removal of bone, however, failed to show any trace of posterior or lateral canals; these had evidently become filled up by new bone formation. Facial twitchings on two occasions. On following day signs of meningitis became evident. Death four days after operation.

Postmortem.—Basal meningitis; edema and congestion of brain; no perforation of dura of posterior or middle fossæ; caseous areas at root of lung; subsequent microscopic examination of the inner ear showed that the canals had all been obliterated by new bone formation, while the vestibule and lower part of the cochlea contained granulation tissue.

Remarks.—The operator found that while curetting the promontory towards the close of the radical operation the spoon passed into the cochlear cavity, which contained pus and granulation tissue. It was therefore considered best to perform Neumann's labyrinth operation. The case was evidently one in which spontaneous cure of labyrinthitis had occurred in the semicircular canal region while the vestibule and cochlea still contained pus and granulation tissue.

Case 4.—M. G——, female, aged 26. Admitted August 4, 1911. C. O. M. S., bilateral, after scarlet fever and diphtheria at the age of 5 years. The right ear has for years been completely deaf. Four weeks before admission she received a blow on the left ear and suffered from giddiness and vomiting for two days. The left ear has now become quite deaf and she has had pain and noises in it since her accident. On both sides the drumhead is absent, and the inner wall pink and moist. No spontaneous nystagmus or fistula symptom. Cold caloric reaction absent on right side but on left produced nystagmus in 20 seconds. Conservative treatment adopted but

failed to benefit the noises. Patient insisted on operation, though told it was not free from danger. Radical mastoid operation on left ear; cholesteatoma present; inner wall cleansed with peroxide and painted with iodine; lateral canal opened; external wall of vestibule and cochlea removed, and modiolus curetted; cavity packed with iodoform worsted. In the evening patient sick and giddy with marked nystagmus to the right. External objects appeared to move from right to left. Dressings soaked with cerebrospinal fluid. Patient reports the noises have gone. During the next few days signs of meningitis developed—fever, headache, Kernig, stiffness of neck. Lumbar puncture evacuated turbid fluid under tension. Second operation: Bone removed from triangular area and dura of posterior fossa opened. Drain inserted. Later, patient became comatose, with Cheyne-Stokes' respiration. Death 18 days after the first and eleven days after the second operation. Permission for autopsy refused.

Remarks.—This patient declared that she would "go mad" unless something was done to relieve her noises, and it certainly appeared that she spoke the truth. It would have been better, however, if the radical operation alone had been performed in the first place, so as to obtain if possible a clean, dry cavity. If in spite of this the unbearable noises had continued, the removal of the cholea could then have been performed with less risk.

INTRACRANIAL COMPLICATIONS.

These cases number 25, of whom 17 were males and 8 were females. The average age was 19 years. All the patients were under 30 years of age.

The Edinburgh Royal Infirmary draws from a very large area, including Fifeshire, the Lothians and the border counties. In fact the majority of the patients dealt with in this report came from districts outside Edinburgh and Leith. Fifteen of the 26 labyrinthine and 17 of the 25 intracranial cases came from the country. Many of the cases with intracranial complications were not sent in for several days or even for one or two weeks after grave symptoms had developed. For this reason it is not surprising that there is a considerable mortality associated with operations for the relief of intracranial lesions.

Up till comparatively recently the course on "diseases of the nose, ear and throat" has not been compulsory, and many general practitioners fail to realize the serious nature of symptoms arising as a result of middle ear suppuration. The majority of practitioners have now learned to send in to hospital without delay cases of appendicitis, strangulated hernia or ruptured gastric or duodenal ulceration, but they still retain cases of suppurative otitis media associated with headache, vomiting, giddiness, rigors, etc., and treat them by means of sedative powders or counter irritation.

In 8 of the intracranial cases there was delay in operation. As a rule this was the fault of the patient or his friends, who refused operation, but in one or two cases the intracranial complication occurred between the time at which the patient was first seen (when no urgent symptoms were present) and that at which there was a vacant bed ready in the Department. Such occurrences are almost bound to happen in the presence of a long "waiting list." Four of these 8 cases ended fatally.

Cholesteatoma was present in 18 of the 25 cases.

In most instances more than one intracranial complication was present.

(1) Extradural Abscess.—Eighteen cases, 9 recoveries and 9 deaths. A perisinus abscess was present in 15 cases and an extradural abscess in the middle fossa in 1 case. In 1 case both perisinus and middle fossa abscesses were present. In 7 cases extradural abscess was the only intracranial complication present; all of these cases recovered.

(2) Labyrinthitis.—Seven cases associated with intracranial complications and not included in previous part. (a) Circumscribed labyrinthitis, 3 cases—1 recovery and 2 deaths. Of the 2 fatal cases 1 had sinus thrombosis and the other had purulent meningitis. (b) Diffuse labyrinthitis, 1 case, recovery. (c) Latent labyrinthitis, 3 cases—1 recovery and 2 deaths. Of the 2 fatal cases 1 had sigmoid sinus thrombosis and meningitis and the other had cerebellar abscess.

(3) Sigmoid Sinus Thrombosis.—Twelve cases—6 recoveries and 6 deaths. In 3 of the 6 fatal cases purulent leptomeningitis was already present on admission to hospital and 1 other developed purulent leptomeningitis after admission.

(4) Temporosphenoidal Abscess.—Four cases—1 recovery

and 3 deaths. In 2 of the 3 fatal cases rupture into the lateral ventricle had probably occurred before the admission of the patient to hospital. In the remaining case rupture occurred after admission.

(5) Cerebellar Abscess.—Three cases—1 recovery and 2 deaths. One death occurred from septic edema of the brain, spreading from the walls of the abscess; the other was associated with meningitis.

(6) Leptomeningitis.—Thirteen cases. (a) Serous meningitis, 3 cases—all recovered. (b) Purulent meningitis, 10 cases—1 recovery and 9 deaths. In all the fatal cases other complications were present, as follows: Circumscribed labyrinthitis, 1; latent labyrinthitis and cerebellar abscess, 1; sigmoid sinus thrombosis, 4; temporosphenoidal abscess, 3.

Summary.—Of the 25 cases 13 recovered and 12 died.

DETAILS REGARDING THE 25 CASES OF INTRACRANIAL COMPLICATION OF CHRONIC MIDDLE EAR SUPPURATION.

Case 5.—C. O. M. S.; Acute Mastoid Exacerbation with Bezold's Mastoiditis; Perisinus Abscess; Sinus opened, but no Clot; Graft of Fascia applied; Slight Fever for a Few Days; Plastic Operation; Complete Recovery.—No. 407. M. K—, female, aged 9, first seen August 30, 1916, with a history of discharge from the left ear of two years' duration after scarlet fever. Tonsils and adenoids were removed a year before admission, but otorrhea continued. Three days before admission the left ear became very painful, and on the following day a swelling appeared in the neck and behind the left ear. Examination: Right drumhead retracted; left meatus full of pus. There was a large edematous swelling over the left mastoid, extending into the neck for a distance of about one and a half inches below the tip of the mastoid. The child held her neck rigidly, with the head inclined to the left. Temperature 100.4° F., pulse 100. Child too ill for functional examination of ear. August 13: Radical mastoid operation left side. Superficial tissues edematous; mastoid process large and cellular, the cells being full of pus; sigmoid sinus exposed by disease and large extradural abscess present in posterior fossa. A Bezold abscess was present internal to the tip of the mastoid. Sinus wall presented a greenish appearance. The sinus was

opened with a knife, but no thrombus present. A postage-stamp graft of fascia was therefore applied. Operation cavity was packed and the wound left open. September 2: Temperature 101.4° F.; at 8 p. m. pulse 100. Yesterday the temperature only reached 100° F. In other respects the child doing well. September 3: Temperature again 101.4° F., pulse 120. Veins of ocular fundus engorged, but disc otherwise normal. September 4: Temperature subnormal, pulse 90. Child vomited once. She has complained of pains over the region of the appendix, but a general surgeon saw no necessity for interference. September 5: Temperature 99.2° F. On September 6 the temperature came down to normal and remained between 97° and 98.4° F. until the patient's discharge. On September 28 plastic operation performed to close the wound behind the left ear. Patient was discharged on October 17 with the wound entirely healed and operation cavity quite dry.

Remarks.—This case was apparently one of mild chronic suppurative otitis media in which an acute exacerbation had occurred, involving the air-cells of the large pneumatic mastoid, and resulting in an extradural perisinus abscess and in a Bezold abscess beneath the tip of the mastoid. The appearance of the sinus at operation led one to open it, but apparently no thrombosis was present. A graft of fascia was therefore applied. For the next three or four days the condition of the patient gave rise to some anxiety, but thereafter the temperature fell to and remained normal. It is quite possible that some sinus thrombosis was present, if not before operation, at least after the sinus had been opened. The ultimate result, however, justified the policy of nonintervention during the short period of fever succeeding the operation.

Case 6.—C. O. M. S. with Polypus; Labyrinth Healthy; Conservative Treatment Failed; Acute Mastoid Exacerbation; Perisinus Abscess and Bezold's Mastoiditis; Radical Mastoid Operation; Uninterrupted Recovery.—No. 401. D. B.—, male, aged fifteen, came to the Infirmary December 18, 1915, with a history of discharge from the right ear of more than one year's duration. On examination the left drumhead was indrawn, while the right meatus showed a polypus surrounded by pus. With the noise apparatus in the left ear the patient could hear the conversation voice at one foot. Tuning

fork tests showed middle ear deafness. Fistula symptom absent. Cold syringing of the right ear caused nystagmus to the left in thirty seconds. The aural polypus was removed under ethyl chlorid anesthesia, and it was then seen that the right drumhead had almost totally disappeared, and that the promontory showed a raw area from which the polypus had apparently originated. Bezold's conservative treatment was begun January 21, 1916, by Dr. Andrew Campbell and continued till May 31. The discharge, however, remained fetid. The patient returned August 8, complaining of pain behind the right ear of two weeks' duration and of mastoid swelling for one week. August 10: Radical operation on right ear; edema of superficial tissues; small periosteal abscess at the mastoid tip; the mastoid process was one large abscess cavity; the sinus was exposed by disease and a perisinus abscess was present in the posterior fossa; the antrum showed cholesteatoma, while the malleus and incus were absent or not found. Only the upper part of the wound was stitched, the lower end being drained. August 11: Temperature, which was normal before operation, has only risen to 99° F., pulse 80, patient doing well. August 12: Wound closed. August 27: Conversation voice at 18 inches by right ear. Operation cavity satisfactory. September 2: Discharged.

Remarks.—This case illustrates the fact that even the most careful intratympanic syringing, with drying and the insufflation of boric acid, fails to cure cases with cholesteatoma in the attic, aditus and antrum. Bezold's treatment was carried out daily for four months, so that it got every chance. In August the patient had an acute exacerbation with an extradural perisinus abscess, calling for the radical mastoid operation. Unfortunately he did not report in 1917 or 1918, so that the ultimate condition of the operation cavity cannot be stated.

Case 7.—Synopsis of Case.—No. 263A. G. L.—, male, aged nine, first seen February 19, 1914. C. O. M. S., right with recent earache and stiffness of neck. One rigor before admission. Evening fever of 102° F. Cerebrospinal fluid slightly turbid and under great tension. R. M. T. red and bulging, with small posterior perforation. Conversation voice heard at 4 ft. with noise box in left ear. Spontaneous nystag-

mus to left and spontaneous pointing error to right and considerable drowsiness. Vestibular apparatus reacted to cold caloric test. Patient deviates to right on walking with eyes shut. Schwartze operation: Large, foul perisinus abscess evacuated; sinus wall showed granulations; sinus opened accidentally and bled freely; pressure applied. Next day cerebrospinal fluid clear but still under pressure. Nystagmus and pointing error continued. Extensor response on Babinski's test. Kernig's sign present. Within a week all signs of meningitis disappeared, but a few days later patient developed scarlet fever and was removed to City Hospital. On dismissal, right drumhead healed though retracted. Whisper heard at 4 feet. This case was recorded in full in *Edinburgh Medical Journal*, January, 1915.

Case 8.—Synopsis.—G. P.—, male, aged seven. C. O. M. S., right, after whooping cough. Pain in right ear for one week, with drowsiness; vomiting for one day. Cholesteatoma in right meatus. Functional examination impossible but no spontaneous nystagmus present. Lumbar puncture—cerebrospinal fluid under great tension but clear; no growth. Rigor, with temperature of 104° F. on day after admission. Operation revealed a large extradural perisinus abscess with healthy red granulations on sinus wall; cholesteatoma in attic. Sinus not opened. Vestibular apparatus responded to caloric test under anesthetic. Temperature 104° F. on night of operation, pulse 128, Kernig doubtful. No stiffness of neck. Temperature fell to subnormal and pulse to 60. All signs of meningitis disappeared. Uneventful recovery. Case recorded in full in *Edinburgh Medical Journal*, January, 1915.

Case 9.—C. O. M. S.; Extradural Perisinus Abscess; Erosion of Posterior Canal; Radical Mastoid Operation followed by Acute Labyrinthitis; Neumann's Labyrinth Operation; Recovery.—No. 168. W. F.—, male, aged thirteen, first seen August 28, 1912, with a history of discharge from the right ear of three years' duration. During the last three years he has complained of deafness and noises in the right ear, and eighteen months ago he commenced to have attacks of giddiness. For the last three days he has had pain in the right ear.

Examination: Nose and throat healthy. Left drumhead normal. After the foul smelling pus had been syringed out,

the right drumhead showed a perforation in the posterior part, with granulations. No mastoid swelling or tenderness. Cochlear apparatus: Left ear—whisper at 9 feet +. Right ear—whisper at 1 foot. Middle ear deafness right side. Vestibular apparatus: No spontaneous nystagmus or Rombergism. No fistula symptom. Rotation to right produces nystagmus to left for thirteen seconds; rotation to left produces nystagmus to right for seventeen seconds. Cold syringing left ear produces nystagmus in thirty-five seconds; cold syringing right ear—no nystagmus in two and a half minutes.

August 29: Patient's temperature rose to 101° F. last night, pulse 100. Tenderness present today over right mastoid antrum. First operation: Radical mastoid operation by house surgeon, assisted by J. S. F. Cortex normal; mastoid process diploetic; foul pus in antrum; small perisinus abscess; bone in roof of antrum diseased, but dura of middle fossa healthy; lateral canal intact; considerable bone disease on inner wall of antrum in region of posterior canal.

August 30: Temperature normal, pulse 92. Marked vomiting. Third degree nystagmus to sound side and patient lies on this side. Slight pointing error to the right. Slight facial paresis on right side. In view of the findings at operation and of the presence of acute labyrinthitis after operation it was decided to open and drain the inner ear spaces. Second operation at 1:30 p. m. (J. S. F.) Neumann's labyrinth operation performed. It was found that the posterior canal had already been opened at the first operation. Facial nerve exposed for about a quarter of an inch. It appeared red and swollen, but had not been cut through. Vestibule freely opened in front of facial nerve. Operation cavity lightly packed and wound left open. In the evening the temperature was 98.2° F. and the pulse 96. Nystagmus as before. Patient states that he feels as if he were whirling round. August 31: Temperature 98° F., pulse 84. No vomiting since 6 p. m. yesterday. Sensation of rotation has passed off. September 3: Temperature and pulse normal, very slight nystagmus. Facial paresis as before. No giddiness or sickness. Wound behind ear stitched up. September 11, 1912: Rotation to right produces nystagmus to left for fifteen seconds, whereas rotation to left produces nystagmus to right for only five seconds. September

29: Operation cavity is becoming covered with epithelium. General condition satisfactory. Patient discharged, to attend in outpatient department. October 22: Facial paralysis passing off. Operation cavity almost healed. November 16: Facial paralysis practically cured. No discharge in operation cavity.

Case 10.—Synopsis.—No. 379. R. W——, male, aged six. First seen October 8, 1910, suffering from C. O. M. S. (right), with polypus. Patient admitted, but as he cried his mother refused to leave him. Boy brought back six years later, with pain in right ear and history of rigors, headache, drowsiness and delirium. Head flexed. Complete deafness in right ear. Radical mastoid operation; cholesteatoma present; sinus exposed by disease and injured during operation, with resulting profuse hemorrhage; lateral canal opened by cholesteatoma. Neumann's labyrinth operation performed. Next day temperature rose to 104° F. Sigmoid sinus opened and clot turned out; jugular not ligatured. Fever continued and two days later a third operation was performed (jugular ligature). Intravenous injections of eusol. Recovery. Case recorded in full in *British Medical Journal*, 1917, Pt. I, p. 357.

Case 11.—C. O. M. S., with Cholesteatoma; Acute Exacerbation; Perisinus Abscess; Uninterrupted Recovery.—No. 300. J. W——, male, aged eight, first seen May 19, 1915, suffering from discharge from the left ear for some years. A mastoid operation was performed on the right ear last autumn. For three weeks patient has had pain in the left ear and for one week there has been some swelling behind the ear. For three nights the boy has been unable to sleep on account of the pain.

On examination, the left auricle was projecting markedly and over the region of the mastoid tip the swelling appeared to be pointing. The left meatus contained much pus, and on clearing this away granulation tissue was observed. Temperature 100.4° F., pulse 120.

Functional Examination: Cochlear Apparatus.—Raised voice heard at only 6 inches by left ear, and with the noise box in the right ear patient can only hear the raised voice ad concham. Weber lateralized to the left. C32 to C256 not heard by left ear. Vestibular apparatus.—Slight spontaneous

nystagmus to the right; no giddiness. Patient too ill for rotation and caloric tests.

May 20, 1915: Radical mastoid operation left ear (J. S. F.). Large foul smelling subperiosteal abscess opened. Mastoid cortex eroded. First gouge cut released a quantity of foul pus. Perisinus abscess present. Sinus covered with granulations. Dura of posterior fossa internal to the sinus appeared normal. Antrum and aditus contained cholesteatoma. Malleus and incus absent, or at least not found. Tympanum contained granulations. Radical operation completed. Cold lotion applied to inner wall at end of operation at once produced conjugate deviation of eyes to the right. Posterior wound closed. May 25: No fever since operation. Posterior wound healed. All stitches removed today. Cavity looks satisfactory. June 13: Patient dismissed to convalescent home. June 29: Doing well.

Case 12.—Synopsis.—No. 362. J. M.—, male, aged sixteen, first seen January 25, 1916. C. O. M. S. (right). For five days before admission headache on right side, with shivering and vomiting. Labyrinth healthy. First operation (radical mastoid).—Cholesteatoma present: large extradural perisinus abscess (*staphylococcus aureus*). Sinus split up, but jugular not ligatured. Later, pain developed in right lumbar region; exploration of chest negative. Second operation.—Ligature of internal jugular; intravenous injection of eusol; marked tenderness over right ilium; incision here evacuated pus (*staphylococcus aureus*). Fever continued. Operation on right ilium by general surgeon (Mr. J. W. Struthers). Large abscess between inner surface of ilium and iliatus muscle. Recovery. Case recorded in full in *Brit. Med. Journ.*, 1917, Pt. I, p. 358.

Case 13.—Synopsis: No. 269. M. S.—, female, aged thirteen, first seen January 14, 1915. C. O. M. S. (right) after measles; for one week fever, earache, vomiting and retraction of head; meningitis present on lumbar puncture. First operation (radical mastoid). Later, symptoms of septic sinus thrombosis developed. Second operation.—Sinus opened and right internal jugular vein ligatured. Later still, symptoms of cerebellar abscess. Third operation.—Cerebellar abscess

opened and drained. Recovery. Case recorded in full in *Edin. Med. Journ.*, November, 1915.

Case 14.—Synopsis: No. 278. R. T——, female, aged twenty. C. O. M. S. (right). Patient first seen October 16, 1914, and name entered for operation, but patient not admitted for operation till February 17, 1915. First operation (radical mastoid) revealed erosion of lateral canal. Skin graft, however, applied. Ten days after operation fever developed, with headache and vomiting. Cerebrospinal fluid normal. Signs of labyrinthitis present. Second operation.—Neumann's labyrinth operation performed. Later, symptoms of sinus thrombosis developed. Blood culture showed streptococcus. Third operation.—Sinus opened and jugular vein ligatured. Septic symptoms, however, continued, and jugular bulb (fourth operation) performed. Recovery. Case recorded in full in *Edin. Med. Journ.*, November, 1915.

Case 15.—C. O. M. S. (Bilateral); Radical Operation, Right Ear; Cholesteatoma; Perisinus Abscess; Accidental Rupture of Sinus above the Clot: Packing; Sinus Opened and Anterior Wall Excised; Secondary Suture of Wound: Recovery.—No. 279. T. J——, female, aged seventeen, first seen at the Royal Infirmary in March, 1915. She has had discharge from her left ear of unknown causation for at least six years. The right ear has also been deaf for a number of years, but has not discharged. Of late she has had severe attacks of pain in the left ear and two months ago had an attack of sickness and vomiting which lasted eleven days. She is always giddy when she first gets up in the morning and also feels sick.

Examination.—Left meatus full of pus and shows granulations. R. M. T. shows a perforation of Shrapnell's membrane.

Functional Examination: (1) Cochlear Apparatus.—Watch heard at 1 inch on the right side, but only on contact on left. Watch heard well on both mastoids. Whisper at 1 foot right ear and conversation voice at 1 foot left ear. Schwabach lengthened. Weber lateralized to the right (better) ear. Low tones not heard by left ear. (2) Vestibular Apparatus.—Rombergism doubtful. Rotation to right and also left produced after-nystagmus of thirty seconds' duration. Cold syringing of each ear induced nystagmus in sixty seconds.

First operation, March 27, 1912. Radical mastoid operation on left ear by Dr. Logan Turner.

July 22, 1913: Patient reports. Left (operated) ear dry, but right ear discharging. February 20, 1915: Patient returns, complaining of severe pain in her right ear for the last five days. During the last day or two she has vomited and has been unable to sleep at night.

Examination.—No rigidity of neck. Kernig's sign absent. No spontaneous nystagmus or giddiness. Watch heard on right mastoid and raised voice heard at 1 foot by right ear. Weber still lateralized to the right. On cold syringing of the right ear nystagmus to the left is produced in two minutes.

Operation on Right Ear (J. S. F.), February 22, 1915.—Mastoid cortex normal. Process sclerodiploetic. Large foul smelling perisinus abscess is opened (pure growth of pneumococcus obtained on culture). Anterior wall of sigmoid sinus grayish green and sloughy. Antrum full of cholesteatoma. Only remnants of the ossicles found. The sinus was now further exposed in a backward direction, and in doing this the vessel was ruptured and a very free flow of blood was obtained from the torcular end. The wound was plugged and left open. February 23: Temperature 97 to 98 degrees F., pulse 84, respirations 24. Patient fairly well. February 26: Headache and vomiting through the night. Temperature 97° F., pulse 60. The tongue is covered by dry brown fur. No nystagmus. February 27: Temperature and pulse as yesterday. Ear dressed. The cavity looks well. The packing was removed from the sinus and no bleeding occurred. The anterior wall of the sinus was removed with forceps and scissors and the cavity was found to contain dark red clot and some granulation tissue. In spite of the subnormal temperature, the slow pulse and the condition of the tongue the patient looks well, so that it has been decided to wait and not to operate further in the meantime. March 1: Temperature 98° F., pulse 76. The tongue is now clean and moist and the mastoid cavity satisfactory. In view of the satisfactory condition of the patient the retroauricular wound was closed today with stitches. March 6: Temperature 98° F., pulse 76. Wound healing fairly well. The mastoid cavity is satisfactory. March 21: Patient dismissed, to report once or twice weekly. The

wound behind the ear is healed and the mastoid cavity looks well.

Case 16.—C. O. M. S. (left); Rigors; Sigmoid Sinus Exposed by another Surgeon, but appeared healthy; Hectic Fever Continued; Blood Culture showed Streptococcus. Second Operation by J. S. F.: Jugular Vein ligatured; Sigmoid Sinus full of Septic Clot; Drowsiness Present after Second Operation and some Return of Fever but Second Blood Culture negative. Third Operation: Plastic Closure of Wound; Recovery.—No. 473. C. K——, female, aged twenty-five, was brought to the Infirmary December 10, 1917, complaining of pain in the left ear, headache, vomiting and loss of sleep. The patient had a rigor ten days before admission. She was admitted to the wards of another surgeon who found tenderness over the left mastoid, temperature 100° F., marked neck rigidity and middle ear deafness in the left side. Patient was operated upon by the surgeon shortly after admission. The mastoid cortex was normal and there was no pus in the antrum. The dura of the middle fossa was exposed and appeared healthy. Lumbar puncture at the end of the operation yielded clear fluid under tension. The case did not do very well after operation and there were daily elevations of temperature, which in the afternoon reached 100° F., 102° F. and finally 105° F. on December 16th. As the surgeon who had operated was absent on holiday the patient came under the care of J. S. F.

December 17: Examination showed a dry, brown tongue. Patient appeared hectic. There was no headache, vomiting, giddiness or nystagmus. With the noise box in the left ear patient was quite deaf. A blood culture was made. (The report issued on December 19 was to the effect that a Gram positive streptococcus was present which showed chains up to 80.) December 18: Second operation (J. S. F.) The left internal jugular vein was ligatured above the junction with the common facial. At this point the vein appeared healthy. The vein was divided but both ligatures were left on. The sigmoid sinus was then exposed towards the torcular for an inch and a half. The anterior wall was slit up and the vessel found full of red clot. Microscopic sections of the vein wall and clot showed Gram positive diplostreptococci in great num-

bers. The clot was turned out and the anterior wall excised. Slight bleeding was obtained from the torcular end but none from the bulb end. The anesthetist now reported that the patient was rather collapsed, and accordingly no further attempt was made to get beyond the clot towards the torcular. In the afternoon the temperature rose to 103° F., pulse 120. Salines were given per rectum. December 19: Fairly good night. Wound dressed; no bleeding from torcular end of sinus. Worstest drain inserted into cavity of sinus. Ligature removed from bulb end of jugular vein but attempt to wash through from the sinus to the neck failed. December 20: Temperature now much lower—98 to 99.6 degrees F., pulse 92 to 104. Some reaction in wound. No bleeding from either end of sinus; no rigors; patient rather flushed. She has been drowsy till today, but is now brighter and takes food better. December 23: Temperature has come down to normal; pulse 104. Wound looks well. Bleeding today from torcular end of sinus. December 26: For the last three days there has been a recurrence of fever in the afternoon, temperature rising to 101° F. and the pulse to 120. Patient is still rather drowsy. A second blood culture was made on the 24th, but shows no growth. December 29: Temperature normal for four days; pulse 92. No packing in either end of sinus. Neck wound stitched today. January 14, 1918: Plastic operation was not a great success, but the wound is decidedly smaller than before. February 14: Wound behind ear is healed. The operation cavity looks well except for the continuance of discharge from the eustachian tube.

Remarks.—Case appears to have been a fairly typical one of septic thrombosis of the sigmoid sinus. The only remarkable feature in the case was the patient's drowsiness—a condition one does not often meet with in sinus thrombosis. The case, however, presented no other symptoms of brain abscess. It is possible that the drowsiness may have been associated with the condition of the lateral sinus. The operator was aware that he had not obtained free bleeding and reached healthy brain wall when the operation had to be stopped on account of the condition of the patient. The progress of the case after the operation, however, was fairly rapid towards recovery.

Case 17.—C. O. M. S. with Cholesteatoma; Extradural Perisinus Abscess; Lumbar Puncture Showed Meningitis; Sinus Thrombosis present but Jugular not ligatured; Later, Cerebellar Abscess Evacuated; Death.—G. D——, male, aged eight. C. O. M. S. (right) for three years, since scarlatina. Sudden onset of earache, shivering, giddiness and vomiting. Edematous swelling over mastoid. Marks of old glandular abscess in neck. Right ear not deaf. Rotatory nystagmus to right. At first operation mastoid cortex whitish gray, foul pus in mastoid (*B. coli*). Extensive extradural perisinus abscess; antrum full of cholesteatoma; incus absent. Respiration stopped on three occasions during operation. Lumbar puncture showed cerebrospinal fluid under pressure. Polymorphs and organisms present. Hectic temperature for three days after operation; occasional vomiting. Second operation.—Sinus opened and thrombus removed; free bleeding from both ends of sinus; jugular not ligatured; cerebellar dura opened and gauze drain inserted. Kernig's sign developed and optic neuritis. Two days later (third operation) cerebellar abscess evacuated. Eight days after third operation temperature rose to 103° F.; vomiting present. Meningitis became more marked and patient died from coma twelve days after third operation.

Postmortem.—General purulent meningitis; large abscess in right lateral lobe of cerebellum; right internal jugular vein not thrombosed. Microscopic examination of labyrinth showed organization of thrombus in roof of jugular bulb; meningitis in internal meatus; cochlea normal; engorgement of vein accompanying aqueduct of cochlea and also of vessels of fossa subarcuata; no perforation of windows; vestibular structures normal; erosion of bone of lateral canal exposing endosteum, but no circumscribed labyrinthitis. Posterior canal showed circumscribed labyrinthitis, the erosion having occurred from the extradural abscess in the posterior fossa.

Case 18.—C. O. M. S. with Cholesteatoma; Acute Exacerbation, with Rigors, Vomiting, and Signs of Meningitis; Extradural Perisinus Abscess but no Sinus Thrombosis; Death apparently from Meningitis; Postmortem refused.—E. R——, female, aged twelve. C. O. M. S. (right). Sudden onset of earache and headache. Wilde's incision by patient's doctor. Hectic temperature with rigors and vomiting for a fortnight.

Diplopia for two days. Examination: Temperature 104.5° F.; dry, brown tongue; retraction of head; photophobia; paralysis of right external rectus; Kernig's sign present; marked but not complete deafness in right ear. Patient too ill for functional examination. Immediate operation.—Mastoid cortex whitish gray; large extradural perisinus abscess with foul pus; dura greenish and sloughy; cholesteatoma in antrum; ossicles absent; tympanum full of granulations; sinus opened and free bleeding obtained. Lumbar puncture: fluid under slightly increased tension but apparently clear. Excess of white cells but no organisms. Temperature continued high for two days, pulse 140, respirations 44. Moist sounds at base of lungs. Meningitic cry developed. Death three days after operation. Postmortem refused.

Case 19.—C. O. M. S. (bilateral); Patient a Deafmute as the Result of Old Labyrinth Suppuration on both Sides; Recent Acute Exacerbation of Middle Ear Suppuration on Right Side, with Commencing Meningitis; Radical Mastoid Operation; Perisinus Abscess and Sinus Thrombosis; Jugular Ligatured; Rigors Continued. Intravenous Injection of Eusol; Metastatic Abscesses in Lung with Empyema; Death.—No. 454. C. S.—, a male, aged ten, seen at the Royal Infirmary on January 5, 1917. Patient came from the Deaf and Dumb Institution at 54 Henderson Row, Edinburgh. Unfortunately very few details were obtainable. The mother was in prison and was seen only after the death of the patient. The father was absent in France on active service. The mother herself was rather deaf and stated that her deafness came on after the birth of her second baby. She suffered from tinnitus. The mother stated that she had never had any miscarriages, but her fifth pregnancy resulted in the birth of a stillborn child. Of her twelve children only the patient was deaf. She stated that the boy had never spoken and had not had otorrhea as a baby. He was late in learning to walk—two years and eight months. The patient had been in the Deaf and Dumb Institution since the age of eight. The discharge only began just before he went to the Deaf and Dumb School. Note.—It is doubtful whether much importance is to be attached to the mother's statements.

On examination the right external meatus was filled with

discharge, and, after syringing, an attic perforation was observed, from which some cholesteatoma protruded. The left drumhead was retracted and showed an adherent scar in the posterior superior part. Functional examination was impossible, as we were not able to communicate with the boy. The radical mastoid operation was advised, but, as has been explained above, there was some difficulty in obtaining permission.

June 20: Patient admitted as an urgent case for operation. About June 16 the boy began to be feverish, the temperature rising to 101° or 102° F. each afternoon. The right external meatus was now found to contain a polypus. It was again found that functional examination was almost impossible. When the sounding tuning fork was placed on the patient's vertex he only nodded his head and smiled. Apparently he did not hear any of the tunings forks by air conduction on either side and did not respond to vowels spoken in a loud voice close to his right ear. When the left ear was tested in the same way he nodded his head as if he heard something (?). Vestibular apparatus.—No Rombergism, no spontaneous nystagmus, no fistula symptom; rotation to left and to right produced no nystagmus; cold caloric test was negative on both sides. The temperature rose at 8 p. m. on the day of admission to 106° F., but there was no shivering or vomiting. The boy, however, became cyanosed and drowsy. There was apparently slight pain on pressure on the neck.

June 21: Temperature 101.8° F., pulse 116, at 8 a. m. The medical managers of the infirmary were communicated with and decided that operation should be performed at once in spite of the lack of permission from the parents. 12 noon: Operation.—Chloroform, followed by ether. Lumbar puncture performed on the table; cerebrospinal fluid clear and not under tension. (Microscopic examination showed some increase of cells, mainly polymorphs and a few diplostreptococci. No growth on culture.) The usual incision was made for the radical operation, behind the right ear. The superficial tissues and mastoid cortex were normal, the process was sclerodiploetic. The antrum contained foul smelling pus under tension. The long process of the incus had disappeared and the malleus had granulations adhering to it. The bone over the sinus was

removed and the perisinus abscess evacuated. Direct films from the pus were swarming with organisms. A Gram positive diplostreptococcus, Gram positive bacilli and two types of a Gram negative bacillus. Cultures showed the Gram positive diplococcus and the Gram negative bacillus. The sinus wall was grayish green and necrotic. A horizontal incision was made in a backward direction towards the torcula for two and a half inches, and the bone removed until healthy sinus wall was reached. The sigmoid sinus was slit up and found to be full of a blackish green clot. Free bleeding was obtained from the torcular end, which was plugged. The sinus was then exposed towards the bulb, but it was impossible to reach a healthy part. (The anterior wall of the sinus was excised and a subsequent microscopic examination showed a thrombus adherent to the wall. The thrombus contained masses of cocci in pairs and chains.) The right internal jugular vein was accordingly ligatured below the common facial, which was tied off. The upper end of the internal jugular vein was found to be clotted. As the lower end was also clotted at the point of ligature a further dissection was carried out in a downward direction for about an inch until a nonclotted portion of the vein was reached. By this time the child was very pale and the pulse feeble. The bulb end of the internal jugular vein was stitched to the skin; the operation wounds were lightly packed and left open. The patient was returned to bed, the limbs bandaged and the foot of the bed raised. Duration of operation nearly two hours. Saline solution was given intravenously, and later, pituitrin. 8 p. m.: Patient cyanosed, cold and clammy. Pulse not countable. Saline given per rectum and brandy by the mouth. Saline also given intravenously. Temperature 103.6° F. June 22: Patient has had a bad night. Temperature 96.6° F. this morning, pulse 92, respirations 26. Boy is taking some nourishment. Evening temperature 98.8° F., pulse 84. June 23: Patient has had a better night; slept fairly well. Temperature 98.8° F., pulse 106. At 12 noon, however, the boy had a rigor with cyanosis, followed by sweating. Wound dressed at 1 p. m. The posterior wall of the sigmoid sinus looks sloughy. Bulb washed through, but no pus washed out. Free bleeding obtained from torcular end when packing removed. In view of the urgent need of the

case Prof. Lorrain Smith was consulted regarding intravenous injection of eusol, and on his advice at 5 p. m. 50 c. c. were given under chloroform anesthesia. About an hour later the boy became cyanosed and had a rigor, with feeble pulse and rapid breathing. Later in the evening he vomited and the temperature rose to 103° F. June 24: Patient had a good night. Temperature 98.2° F., pulse 100. June 25: Temperature rising today from 100 to 102 degrees F., pulse 120. The boy is very emaciated and is not taking his food well. There is no reaction in the wound. The jugular bulb again washed through and only clear fluid returned. On June 26 the patient had a fairly good day, and on the 27th the temperature again rose to 104° F. The patient's breath has a sickly sweet odor and the wound is very inactive. There is no bleeding now from the torcular end of the sinus. Prof. Lorrain Smith advises against a further injection of eusol. June 28: Patient has now developed a short cough and there is a suspicion of friction on the right side in the postaxillary line. The wound shows slight signs of reaction. June 30: There have been daily risings of temperature to 102 or 103 degrees F.; pulse varies from 110 to 160; respirations 36 to 44. The wounds in the head and neck show slight reaction, but the arm wound shows none. Examination of the chest reveals feeble breath sounds. The right base was explored, but no fluid obtained. The mental faculties are clear, but the patient is bothered by coughing fits. July 2: Rigor at midnight last night. Temperature 105° F., pulse 152. Today second intravenous injection of eusol given under chloroform anesthesia, the vein again being exposed by dissection. (Blood culture showed no growth on the first and second day, but on the third a Gram positive staphylococcus was noted—probably a contamination from the skin.) July 4: Temperature rose to 103.8° F. at 8 p. m., pulse 148. Patient taking his food better, but the head wound is still very inactive and the cerebellar dura looks sloughy, while the cut edges of the bone are blackish. The lungs were examined by a physician, who found dullness at both bases but no signs of fluid. July 6: Patient has got weaker and thinner and the eyes are becoming sunken. The wounds show no reaction. There is dullness at the left base, but the physician reports no signs of fluid. There is now some

incontinence of urine and feces. There are daily risings of temperature varying from 101 to 104 degrees F., the pulse from 120 to 160, and the respirations have been as high as 58. Patient has been getting nuclein for the last day or two and also champagne and beef juice. July 8: Conditions as regards temperature, pulse and respirations much the same. Anti-streptococcus serum given. Patient is rapidly going downhill. July 12: Patient died at 7:15 p. m. today.

Postmortem.—Postmortem clot in superior longitudinal sinus; soft thrombus in the right lateral sinus. The left pleural cavity showed much purulent effusion. Left lung collapsed. On section the left lung showed multiple abscesses. Right lung edematous and congested and on section shows one or two small abscesses. Liver large, pale and fatty. Kidneys pale, soft and friable. Spleen enlarged, pale and soft. There was a small focus of suppuration at the point of the ligature of the right internal jugular vein, but below this the vein appeared healthy.

Remarks.—We were somewhat handicapped in dealing with this case owing to the fact that the father was absent on military service and the mother in prison. The value of the history subsequently obtained from the patient's mother is more than doubtful, and the probability is that the patient had discharge from both ears early in life and that the deafmutism was due to labyrinthitis following an extension of the middle ear suppuration on both sides. Subsequent microscopic examination of both inner ears has shown the accuracy of this opinion, but details must be held over at present. If we had been able to admit and operate on the child when he was first seen in January, 1917, it is probable that a good result would have been obtained—at least as regards the life of the patient—but unfortunately permission for operation could not be got at this time. When the boy was brought back in June of the same year he already had an intracranial complication—i. e., extradural abscess and septic thrombosis of the sigmoid sinus. Again, there was slight delay in operating on account of the difficulty in getting permission. The operation revealed cholesteatoma, perisinus abscess, thrombosis of the sigmoid sinus and upper portion of the right internal jugular. The condition of the patient at the end of operation was grave, and various

restorative measures were employed. The case did not do very well after operation, and about a week later developed a cough. At first it was thought that there was dullness at the right base and this was explored. As will be seen from the postmortem report the left pleural cavity was full of purulent fluid and the left lung collapsed. Had this condition been discovered during life it is at least possible that the result would have been different. In view of the condition of the chest it is not surprising that the various methods of treatment adopted—e. g., saline transfusion, stimulants, intravenous injection of eusol, antistreptococcus serum, etc., were without result. It is true that the postmortem showed a soft clot in the right lateral sinus and a small area of suppuration in the lower end of the right internal jugular vein, just at the point of ligature, but the operator is of opinion that the small amount of sepsis in these situations would not have led to death had the chest condition been diagnosed and treated.

The moral would appear to be that in cases of sinus thrombosis with chest symptoms too much reliance must not be placed upon the physical signs and the opinion of the physician. We should be ready to explore both sides of the chest with a large needle and syringe, in order to make sure that there is no accumulation of pus in the pleural cavity.

Case 20.—Chronic Suppurative Otitis Media (Bilateral); Cholesteatoma and Circumscribed Labyrinthitis (Fistula) on Right Side; Septic Thrombosis of Right Sigmoid and Lateral Sinuses. First Operation: Extradural Abscess (R.); Radical Operation Performed; Sigmoid Sinus Opened and Internal Jugular Ligatured; Rigors Continued; Second Operation on Jugular Bulb; Death. Postmortem; Extensive Thrombosis of Cerebral Sinuses; Infarcts in Lungs and Bronchopneumonia; Septic Changes in Internal Organs.—No. 250. A. B—, female, aged fifteen, came to the Royal Infirmary August 24, 1914, with a history of discharge from the right ear since the age of five years. For two weeks she has had pain and noises in the ear. For two days the pain has been so severe that the girl has been kept in bed. At first the pain was situated behind the ear and in the neck but on admission the patient also had frontal headache. For a month or two she has complained of giddy attacks and has vomited frequently during the

last four days. For two days patient has had shivering attacks.

Examination.—Patient is somewhat drowsy but answers questions distinctly. Temperature 98.6° F., pulse 100, respirations 20. She is slightly cyanosed and the tongue is dry and furred. There is no irritability but the cheeks have a hectic flush. There is no loss of memory and the patient readily recognizes articles which are shown to her. No facial paralysis. The patient is so deaf that one has to shout to her. Pupils are equal and contracted. Eye movements normal. No photophobia. Pressure on eyeballs rather painful. Cutaneous hyperesthesia present and slight dermatographia. Knee jerks not active. Kernig's sign present. No retraction of abdomen. No optic neuritis. Ears: Right meatus full of pus and debris. After syringing it is seen that the tympanic membrane has disappeared and that cholesteatoma is present in the upper part of the tympanum. There is tenderness on pressure below and behind the mastoid. Patient objects to her head being moved. The left meatus is also full of debris, and after syringing a pulsating spot of light can be seen.

Functional Examination: Cochlear Apparatus.—The conversation voice is not heard by either ear. Even a shout cannot be heard by the right ear, but by the left ear the raised voice is heard at 6 inches. The watch is not heard by air or bone conduction on the right side, but on the left it is heard at one-half inch by air conduction and is also heard on the mastoid. Weber lateralized to the left (better ear). Rinne negative on the left side and absolutely negative on the right. No tuning forks are heard by the right ear by air conduction, but the upper forks are heard by the left ear and the upper tone limit on this side is normal.

Vestibular Apparatus.—There is slight spontaneous nystagmus to the left, but no spontaneous pointing error. Fistula symptom is positive on the right side and produces giddiness. Cold syringing of the right ear produces no nystagmus even after two and a half minutes. The caloric test was not carried out on the left side, as the patient was not well enough.

Lumbar puncture evacuated fluid under great tension but not turbid. No increase of cells observed and no organisms

found after centrifuging. On culture only staphylococcus albus obtained (contamination?).

First operation on day of admission. A large extradural perisinus abscess was evacuated. The process contained some gas. The dura of the sinus and of the posterior fossa around it was gray and sloughy. The radical operation was performed. The perisinus abscess appeared to be quite cut off from the cholesteatoma in the antrum. The malleus and incus were absent. A fistula was found in the posterior part of the lateral canal prominence but was not further investigated and the labyrinth operation was not performed. A transverse incision was now made and the lateral sinus exposed in a backward direction for about 2 inches. The sinus was slit up and a firm reddish brown clot removed. (Small Gram negative organism, coccus or bacillus?) The clot extended backwards towards the torcular. Free bleeding was obtained from the torcular end. The sinus was now traced downwards and was found to be in a collapsed condition. The superior petrosal sinus was also clotted. As no free bleeding was obtained from the bulb end of the sigmoid sinus the right internal jugular vein was exposed and ligatured above the junction of the common facial. The upper end of the divided jugular was not opened at the time of operation. Both wounds were lightly packed but not stitched. An attempt to obtain blood from an arm vein for culture failed owing to the collapsed condition of the veins. Saline injections were given at the end of operation, which lasted about two hours.

August 25, 1914: Temperature 98° F., pulse 108. Patient looks fairly well and tongue is cleaner. August 26: Rigor at 2 a. m. and another at 11 a. m. Wound dressed and upper end of vein in neck opened. Attempt to wash through the bulb not successful. August 27: Temperature 101° F., pulse 120. Vein washed through. Patient has been vomiting. August 29: Temperature has remained about 101° F. and pulse 120 for the last two days. Patient has been restless but has had no more rigors. There has, however, been sweating. The packing was removed yesterday from the torcular end of the sinus but had to be replaced owing to hemorrhage. September 1: Temperature has been lower for the last two days (about 100° F.) but today it has risen to 104° F. and patient has

had a rigor with sweating. The sinus has been washed out daily and a lot of pus has been obtained from the bulb end. September 3: Patient had two rigors yesterday with temperatures of 104° and 105° F. It was accordingly decided to give her the chance of operation on the jugular bulb after the matter had been fully explained to her parents.

Second Operation.—Further removal of bone of posterior cranial fossa so as to expose sinus behind the facial nerve. The cerebellar dura was raised with Stacke's protector. There was no facial twitching. The jugular bulb was reached without much difficulty and a soft catheter passed down through it into the vein in the neck. September 4: Temperature 99° F. since last operation but pulse 130. The wound is fairly clean but shows very little reaction. September 7: The temperature reached 106° F. yesterday and the rigors have recurred. The wound shows no reaction. September 10: Rigors have been of frequent occurrence, temperature reaching 105° and 106° F. on several occasions and the pulse varying from 140 to 170. Optic neuritis is now distinct on the right side. September 11: Death.

Postmortem.—Organized adherent clot present in the torcular end of the right lateral sinus and also in the superior longitudinal and straight sinuses. The lumen of these has been partially restored. In the superior longitudinal sinus there is some softening of the clot. There is no meningitis and only slight congestion of the pia. The brain on section shows only edema.

The lower part of the right pleura shows slight recent pleurisy. There are several pale areas in the lungs showing commencing fibrosis, and towards the surface there are well defined infarcts with pleurisy over them. Scattered throughout the lung there are small patches of bronchopneumonia. Generally the lungs show edema and congestion while the lower lobe of the right lung is collapsed. The heart is dilated but there is no endocarditis.

There are old caseous glands in the mesentery. The liver and kidney show well marked cloudy swelling. There are no infarcts in the spleen but the organ is enlarged and of a uniform pink color.

Microscopic examination of right middle and inner ear: The inner wall of the tympanic cavity is covered by squamous epithelium (cholesteatoma); membrane of the round window thickened; the facial nerve on the inner wall of the tympanum is surrounded by fibrous tissue. The ampullary end of the posterior canal and aqueduct of the vestibule have been opened at the operation on the jugular bulb. There is considerable organization of clot in the jugular bulb. The cochlear opening of the perilymph aqueduct contains pus cells. It is remarkable that in this case the scala media contains semipurulent exudate and the membranous structures are hardly recognizable. The fundus of the internal meatus contains a little pus. The lateral canal shows a fistula (circumscribed labyrinthitis); both perilymph and endolymph spaces of the lateral canal contain pus.

Case 21: C. O. M. S. (Bilateral); Operation Performed on Left Ear (Dr. Turner); Cholesteatoma; recovery. Later, Operation done on Right Ear by Clinical Assistant under Supervision (J. S. F.); Dura Middle Fossa Exposed; Skin-graft Applied. Subsequent Condition Unsatisfactory; Headache, Drowsiness, Dilatation of Right Pupil, etc. Third Operation (J. S. F.); Temporosphenoïdal Abscess Evacuated; Slow Recovery.—No. 455. J. M.—, male, aged seventeen, came to the Infirmary on February 2, 1917, complaining of discharge from both ears since childhood. On admission there was a swelling behind the left ear, which had been incised by his own doctor on three occasions. The fistula was still discharging on admission. Examination showed cholesteatoma in the external meatus. The left canal was narrow. Hearing-tests showed middle-ear deafness on both sides. With the noise-apparatus in the left ear the patient heard raised voice at 3 feet, and, with the noise-box in the right ear, he heard the raised voice at 2 feet. Rotation both to right and to left gave an after-nystagmus of normal duration (twenty-five seconds). Cold syringing of the right ear produced nystagmus after two minutes, but on syringing the left ear there was no response after three minutes (external meatus very narrow).

February 7: First operation (Dr. Logan Turner).—Left mastoid cortex eroded. Process sclerotic; antrum contained cholesteatoma; inner end of posterior meatal wall entirely de-

stroyed; roof of antrum also gone. Ossicles not found; labyrinth wall healthy. Graft applied. Patient made a good recovery after the operation on his left ear and left the hospital on March 10.

June 1: Patient readmitted for operation on the right ear. June 4: Second operation by clinical assistant, supervised by J. S. F. Radical operation on right ear. Mastoid cortex healthy; process diploic; antrum small; sinus far forward; middle fossa low; dura exposed here for an area of about $\frac{1}{2}$ inch square; antrum contained pus; malleus and body of incus ankylosed; tube curetted; Koerner flap; cavity skin-grafted and wound behind ear closed. June 8: First dressing. Stitches removed; graft in position; temperature has been slightly elevated in the evening since the operation. June 11: Temperature about 100° F. for last two days, pulse 84 to 100. Posterior wound healed; ear clean; graft in position. First degree nystagmus to left. June 14: Vomiting. June 17: Patient very drowsy; complains of frontal headache; vomiting continues; no rigidity of neck, but slight suspicion of Kernig's sign; knee-jerks normal; plantar flexion. June 18: Temperature 98° F., pulse 60. Slight spontaneous nystagmus to right (side of recent operation). No pointing error; patient hears conversation-voice at 18 in. with left ear closed with finger and raised voice at 1 foot with noise-box in left ear. Prompt response to cold syringing of right ear. Patient is becoming thinner. Conclusion came to was that there were no signs of labyrinthitis or of cerebellar abscess or of thrombosis of the sigmoid sinus, but that there might be some meningeal irritation or possibly an abscess of the temporosphenoidal lobe.

June 18: Third operation at 12 noon (J. S. F.). Old incision, which had firmly healed, was opened up; skin-graft removed. Wound cavity appeared satisfactory. Nothing further done; cavity packed with hypertonic saline gauze; urotropin given. Lumbar puncture performed, fluid clear, films showed a few polymorphs and a marked increase in the lymphocytes, but no organisms. No growth on culture. The reaction of the fluid was alkaline; sugar absent; albumen and globulin increased.

June 19: Temperature 98° F., pulse 56; pupil of right side

dilated; twitching of limbs, especially on left side; no vomiting; facial contractions on right side. 6 p. m.: Fourth operation.—Vertical incision made downwards through right temporal muscle; large area of squama removed with gouge and forceps; dura of middle fossa bulging markedly and not pulsating. Dura incised, and also brain; foul-smelling abscess evacuated. (Film of the pus showed innumerable organisms, mainly Gram negative bacilli, Gram negative diplococci, with some Gram positive bacilli. Cultures showed Gram positive diplostreptococcus, Gram positive bacillus, and also a diphtheroid and a Gram negative motile bacillus. The latter organism was regarded by Miss Fitzgerald as characteristic of brain abscess cases when found in the cerebrospinal fluid.) Cigarette drain inserted. June 20: Temperature 97° F., pulse 56, respirations 20; no vomiting; patient has had a better night. Pupils equal and moderately dilated. Wound dressed; slight hernia cerebri, painted with 10 per cent formol. Two small tubes inserted into brain abscess. June 21: Temperature 97.6° F., pulse 64. Patient looks better and is not so resistive as formerly; tongue dirty and furred; muscles of right side of face still contracted. He yawns frequently. June 23: Temperature 97° to 97.6° F., pulse 64. Patient's memory very defective. He is again noisy and resistive; tries to get out of bed. Lumbar puncture evacuated clear fluid under normal pressure. June 27: Mental condition still the same; patient has struck the nurses. Hernia cerebri as before. Tongue is now clean and his appetite good. Temperature remains between 97 and 98 degrees F. and the pulse about 64. July 2: Patient considerably better. Temperature 98.4° F., pulse 86. Hernia cerebri smaller. Mastoid wound shows reaction. Mental condition improved. July 21: Since last report temperature has varied between 97° F. and normal, and patient has been doing well, but in the last two days temperature has risen to about 100° F. in the evening and pulse to 106, and the patient has vomited and been drowsy. Hernia cerebri increased. Foul smelling pus evacuated on exploring abscess. Herpes on lips has developed. August 25: Since last report condition has been satisfactory. Tube removed three days ago from brain abscess. Patient discharged, but is to come up daily for dressings. February 26, 1918: Both ear cavities satisfactory

except that eustachian tube is open in both sides Brain abscess region completely healed.

Remarks.—The first operation on this case calls for no comment. The second operation was performed by one of the clinical assistants under the supervision of J. S. F. The only possible error appeared to be the application of a skin graft to the operation cavity after the dura of the middle fossa had been accidentally exposed. The patient showed no symptoms of temporosphenoidal abscess on admission before the second operation, and the conclusion came to was that the abscess was the result of this operation. It was remarkable that the wound healed so well and that the operation cavity appeared satisfactory. The temperature, however, became elevated and vomiting set in, followed by subnormal temperature and mental symptoms. There were no signs of labyrinthitis, sinus thrombosis, or cerebellar abscess, and the diagnosis lay between meningeal irritation—the symptoms of which are often anomalous—and abscess of the temporosphenoidal lobe. Lumbar puncture excluded meningitis, and the onset of dilated pupil on the right side, with twitchings of the left side of the body, convinced us that a temporosphenoidal abscess was present. This was confirmed at the last operation. The further progress of the case was slow, and was interrupted about a month after the last operation by retention of pus in the brain abscess. This, however, was relieved by improving the drainage. The patient was a Celt from the far north and was of rather a melancholy disposition. His mental condition after the development of the brain abscess was interesting: from a shy, quiet youth he became resistive and sometimes violent, and this maniacal tendency passed off slowly. The convulsions of the opposite side of the body quickly subsided after the evacuation of the abscess, but the facial contracture on the same side continued for a considerable period. The fact that the patient had a recurrence of the symptoms of brain abscess almost five weeks after the abscess had been opened and drained points to the necessity of keeping these cases of brain abscess under observation for a very considerable period. The writer has known cases which have been operated upon and discharged as cured being brought back to hospital six months and more after the operation, with a recurrence of

the symptoms of brain abscess, and dying from septic edema of the brain in spite of prompt opening of the old abscess cavity. We must admit that the healing power of the brain tissue is very feeble, if, indeed, it can be said to exist at all.

Case 22.—C. O. M. S.; Cholesteatoma; Temporosphenoidal Abscess; Radical Mastoid Operation and Opening of Brain Abscess; Later, Rupture of Abscess into Lateral Ventricle; Meningitis; Death.—No. 230. N. S.—, female, aged eleven, first seen April 17, 1914, complaining of discharge from both ears for five years following scarlet fever and diphtheria. Patient has had occasional pain all these years and for the last three weeks has been vomiting off and on and has not been able to sleep on account of severe headache. No giddiness. Patient's doctor reports that the vomiting was of gastric origin and that there was no tenderness on pressure about the ears. The headache was controlled by phenacetin.

Examination.—The patient looks ill—more so than a stomach condition would warrant. Her eyes are listless and her mental processes dull. The external meatus on both sides contains yellowish green foul smelling pus. After syringing right tympanic membrane is seen to be almost completely destroyed but there is no mastoid tenderness on the right side. Details of left tympanic membrane cannot be made out, but there is marked mastoid tenderness on the left side. Temperature 97.8° F., pulse 60. Tongue furred and dry. Functional examination.—Cochlear apparatus: Watch heard on forehead, on both mastoids and on contact by both ears. Schwabach lengthened, Weber not lateralized. Rinne negative both ears. C32 and C64 not heard by either ear by air conduction. C128 heard by both. Vestibular apparatus: No spontaneous nystagmus; no Rombergism; no pointing error. Patient too ill for rotation and caloric tests. Child can name a penny, pencil, knife and watch, but cannot name keys or a hand-bag. She named a handkerchief very slowly. There is no pain on tapping the skull or pressing on the head. April 18: Child lies on the diseased side. Temperature 96.6° F., pulse 58. Patient has slept badly and yawns a great deal today. She vomited in the early morning and now complains of headache over the left frontal and temporal regions. There is no restlessness, irritability or photophobia. No pain on pressure on eyeballs;

no cutaneous hyperesthesia and no stiffness of neck, but there is distinct tenderness on percussion of the left temporosphenoidal region. Knee jerks absent. Superficial reflexes present. Grasps equal. Sensory aphasia more marked. Pronation and supination tests normal. Optic fundus perfectly normal. The rough test shows no limitation of the field of vision. Leucocytosis 11,000.

Operation.—Slight edema of superficial tissues, especially over posterior part of left temporosphenoidal region. Cortex normal. Mastoid contains scattered cells with greenish brown lining membrane. The antrum showed cholesteatoma (streptococci, Gram positive diplococci, Gram negative bacilli—*B. proteus*). Sinus exposed and found healthy. Malleus and incus absent. Attic cavity very large and full of cholesteatoma. Dura of middle fossa exposed and showed granulations over a small area. Dura opened and temporosphenoidal lobe explored in upward and backward direction. Foul smelling abscess evacuated (Gram positive diplococci and *B. proteus*). Finger passed in and found large smooth walled cavity. Piece of brain removed to provide better drainage. Cavity packed with bismuth gauze. Wound left open. April 19: Patient got heroin at 11 p. m. and thereafter had a good night. No vomiting. Temperature 98.4° F., pulse 76. Tongue clean and moist. Wound dressed and showed a lot of discharge. Patient can now name scissors and a book, but again could not name the key, though she said it was "for opening doors." Headache absent. April 20: Temperature 98.2° F., pulse 76. Patient looks well. She can name all articles shown to her this morning. Abscess cavity draining satisfactorily. No headache or vomiting. April 21: Patient sitting up in bed and anxious to get up. Temperature 98° F., pulse 76. No pus from brain abscess today. Bony wound looks healthy. April 25: Patient has continued to do well. Examination of fundus shows edges of discs slightly hazy. April 27: For the last two nights temperature has been up to about 101° F., pulse 120. No headache or vomiting. Tongue clean and moist though patient has been rather constipated. Brain abscess apparently draining well, but there is a considerable amount of hernia cerebri and the discharge has rather an offensive odor. April 30: Temperature normal for the last two days,

but today it was noted that the dressings were soaked with cerebrospinal fluid. May 3: Discharge of cerebrospinal fluid continues. Temperature normal but pulse 116. May 6: Temperature last night 103° F. Frequent vomiting and severe headache. Patient cries out "My head." Retraction of head and stiffness of neck present. Child is frightened and restless and wants to know what is wrong. Abscess opened up with forceps which easily passed in for a considerable distance—probably into the lateral ventricle. Profuse flow of turbid cerebrospinal fluid. May 8: Temperature up to 103° F., pulse 140. Severe headache and marked retraction. Dry furred tongue. Sordes on teeth. Photophobia present. Child restless and excited and complains of great thirst. May 10: Temperature 104° F., pulse 120. Child alternates between delirium and coma. Tendency to Cheyne-Stokes respiration. Marked hernia cerebri with foul odor. May 13: Complete coma. Temperature normal, pulse 112. Twitchings of face have developed. Lumbar puncture evacuated greenish, slightly cloudy fluid under increased pressure. Oscillating movements of eyes noted. May 15: Death.

Postmortem.—Dura tense. Pus along sulci in a patchy fashion over vertex. Large amount of yellowish green fibrinous pus in interpeduncular space and extending down the spinal cord. The left temporosphenoidal lobe contains a large abscess cavity with grayish green sloughy walls.

There is a small antemortem thrombus the size of a split pea in the left sigmoid sinus.

Remarks.—The result in this case was very disappointing, as the patient continued to do well for ten days after operation. There was, however, considerable amount of hernia cerebri, and the discharge remained offensive. Rupture into the lateral ventricle occurred and thereafter signs of meningitis developed, though less rapidly than usual. Death only took place seventeen days after the rupture.

Case 23.—C. O. M. S. (Right) with Recent Exacerbation; Wilde's Incision before Admission. Radical Mastoid Operation; Cholesteatoma with Extradural Abscess in Middle Fossa; Later, Headache, Rigor, Stiffness of Neck and Optic Neuritis; Slow Pulse and Coma. Second Operation: Temporosphenoidal Abscess Opened but Apparently it had already

Ruptured into Lateral Ventricle; Meningitis; Death.—No. 500. W. R——, male, aged twenty-nine, came to the Infirmary April 3, 1918, complaining of discharge from the right ear of twelve years' duration. Discharge came on during an attack of measles. Three weeks before admission patient had pain in the right ear and a swelling formed behind the ear. His own doctor lanced the swelling a few days before admission. On the day before admission he had a shivering attack. There was, however, no headache, vomiting or giddiness. Temperature 98° F., pulse 72.

Examination of the left ear showed a retracted scar in the posterior part of the drumhead. The right meatus contained pus, and there was marked sagging of the posterior superior wall, which occluded the canal. The mastoid region showed an old scar. The incision made by the patient's own doctor was just below this old scar. Functional examination of the cochlea showed middle ear deafness. Weber lateralized to the right (worse ear). With the noise apparatus in the left ear patient could not repeat spoken words even in a loud tone. He stated, however, that he could hear something. Vestibular apparatus: There was no spontaneous nystagmus; no Rombergism; rotation both to right and to left caused after-nystagmus of normal duration. The caloric test was not carried out on account of the narrowing of the meatus. April 4: Radical operation on right ear (J. S. F.). The old incision was opened up and a small hole found in the mastoid cortex. The antrum was full of cholesteatoma. Malleus and incus were absent or were not found. There was a small extradural abscess in the middle fossa, but as there was no fever present on admission the sinus was not exposed. The cavity was not grafted but the walls were smeared with B. I. P. P. The wound was closed at the upper end but drained at the lower end. April 5: Temperature at 8 p. m., 100° F. Patient was restless and got a hypodermic of heroin. April 6: Patient complains of headache. There has been no vomiting and the pupil on the right side is not dilated. Wound dressed and stitches removed. No pus present but the cavity looks rather inactive. Temperature at 8 p. m., 101.6° F., pulse 84. April 7: Patient looks ill, anxious and frightened. There is great headache and stiffness of the neck. Kernig's sign present.

Examination of the eyes shows congestion and swelling of the right disc. Lumbar puncture evacuated only a little blood stained fluid not under increased pressure. Cultures showed no growth. With the noise box in the left ear patient is still able to hear a little. On examination of the wound it was found that the dura of the middle fossa was not bulging. At noon the patient had a "cold feeling." At this time the pulse was 65, but the temperature 103° F. Patient gradually became comatose during the afternoon. He had, however, received 1/12 gr. of heroin at 4 p. m. on account of the restlessness and pain.

April 7, 1918 (continued): Second Operation, 9 p. m.—Sigmoid sinus exposed and found healthy. Large area of middle fossa exposed. The dura was now found to be tense and not pulsating. A crucial incision was made, and foul, watery pus with bits of brain tissue evacuated. A finger was introduced and the walls of the abscess found to be very soft. Cigarette drains were put into the abscess cavity.

April 9: For the last two days patient has been getting worse and has not slept at all, even after heroin. He was restless yesterday, but today is very drowsy. There has been a free flow of cerebrospinal fluid mixed with pus and brain tissue on dressing brain abscess, which seems to show that the abscess had already burst into the lateral ventricle. The temperature, which has hardly been raised for thirty-six hours, rose in the evening to 101.4° F.

April 12: Patient gradually became weaker and died at 6:45 a. m. Just before death the temperature rose to 104° F. and the pulse to 130.

Postmortem.—The base of the brain was covered with foul suppurative exudate, and there was extensive general congestion of the meninges. A large abscess cavity was found in the white matter at the site of the optic radiation on the right side. The abscess had ruptured into the lateral ventricle and spread forward into the anterior horn and also over to the left lateral ventricle. The abscess appeared to be an acute one.

Remarks.—In this case there is room for some doubt as to whether the abscess was already present on admission. The patient had suffered from a shivering attack on the day before coming to hospital, though he had had no headache. There

were no other signs or symptoms leading one to suspect a brain abscess, and operation revealed only a small extradural abscess in the middle fossa. In view of this the operation cavity was not grafted and the wound was drained at the lower end. Patient did not do well after operation and suffered from severe headache. As is well known, the symptoms of temporo-sphenoidal abscess on the right side are very obscure and diagnosis is correspondingly difficult. There was, however, no dilatation of the pupil on the right side. Lumbar puncture did not give the usual result obtained in cases of meningitis, and blood culture was negative. At the second operation the sinus was exposed and found healthy, but a large abscess of the right temporosphenoidal lobe was evacuated. The discharge from the abscess was foul and watery, and it is almost certain that at this time the abscess had already ruptured into the lateral ventricle. Thereafter the history of the case was that of a purulent meningitis.

Case 24.—C. O. M. S. (Bilateral); Recent Exacerbation on Right Side, with Headaches, Vomiting and Rigors; Kernig Present; Lumbar Puncture proved Meningitis. Radical Operation: Sinus Exposed but appeared Normal. Rigors Continued; Jugular Ligatured; Headache and Signs of Meningitis Became more Marked and Patient Died from Coma. Postmortem: Right Temporosphenoidal Abscess present which had Ruptured into Lateral Ventricle.—No. 514. D. H.—, male, aged twenty-three, admitted June 16, 1918. Patient has had discharge from both ears for many years. Two weeks before admission he complained of headache and vomiting and his temperature was 101° F. Two rigors before admission. Patient treated by his doctor for biliousness and sent to the medical side of the Infirmary as a case of biliary colic.

Examination.—Patient obviously ill and slightly delirious. Tongue dry and furred. Head retracted. Kernig's sign present. Marked nystagmus both to right and to left. Patient not quite deaf in right ear with noise box in left. Marked mastoid tenderness on right side but no swelling. Immediate operation: Lumbar puncture evacuated turbid fluid under great tension (films showed Gram positive diplostreptococci, also numerous degenerated white cells). Radical mastoid operation right ear (J. S. F.). Mastoid sclerotic. Antrum con-

tained foul pus under pressure (diplococcus). Whitish area of bone over sinus. Sinus exposed and found normal. Wound left open. June 17: Quiet night but rigor at 5:30 a. m. Tongue dry and furred. Kernig's sign present.

Second Operation.—Ligature of right internal jugular vein after facial had been tied off. June 18: Rigor at 8 a. m. (Blood culture done on admission now reported negative.) Patient restless and rather noisy; complains of intense headache. Heroin given at 8 p. m. Temperature 101° F. June 19: Fairly good night. Temperature 97 to 98 degrees F. To-day there is marked head reaction. Operation cavity looks very inactive. Lumbar puncture evacuated purulent fluid under great tension. Rigor at 3 p. m. Temperature 103° F. (Report on cerebrospinal fluid shows numerous organisms—Gram positive diplococcus; Gram negative bacillus, *B. proteus* or *B. coli* group; slender Gram positive bacillus.) (Second blood culture has also proved negative.) June 20: Rigor at 1 p. m. Temperature 103° F. June 23: Rigors continue. Patient comatose. Death at 1 p. m.

Postmortem.—Marked general leptomeningitis. There was a small hole on the under surface of the right temporosphenoidal lobe which communicated with an abscess about the size of a large walnut. The abscess had thick walls and contained greenish pus and had ruptured into the right lateral ventricle. Both lateral ventricles contained purulent fluid. The right sigmoid sinus contained recent red clot with no sign of suppuration.

Remarks.—The probable sequence of events was as follows: Chronic middle ear suppuration on both sides with a recent exacerbation on the right side. This was followed by temporosphenoidal abscess on the right side accompanied by headache, vomiting and rigors. As meningitis was present on admission it was probable that there was already some leakage from the abscess at this period. It seems likely, however, that gross rupture of the abscess into the lateral ventricle occurred only about three days before death. The vomiting, which was so marked before admission, was not prominent afterwards, and the symptoms were rather those of sinus thrombosis than of meningitis. As already noted in the previous case an abscess of the right temporosphenoidal lobe is very difficult to diag-

nose. One can only suppose that the absorption of pus from the abscess gave rise to the repeated rigors. It may be of interest to note that the patient's uncle died in Klondyke from a brain abscess.

Case 25.—Chronic Suppurative Otitis Media (left); Latent Labyrinth Suppuration and Cerebellar Abscess (left): Radical Mastoid Labyrinth Operation.—Cerebellar Abscess Opened (Sigmoid Sinus Injured). Death. Postmortem: Edema of Brain round Cerebellar Abscess.—No. 200. J. B—, male, aged twenty-seven, was first seen at the Victoria Hospital for pulmonary tuberculosis August 25, 1913. He gave a history of discharge from the left ear of many years' duration. About three weeks ago, after a cold in the head, he complained of pain in the left ear, associated with vomiting and giddiness. The latter was so severe that he could not stand and he was confined to bed until his removal to the Victoria Hospital two days ago. Vomiting has been frequent. The writers are indebted to Dr. Power, resident physician, Victoria Hospital, for the following notes of the case: The patient was examined at a North of England infirmary some days ago. He was then complaining of pain in the lower dorsal region between the scapulæ and also of pain in the legs which had lasted for five days. The case was diagnosed as one of influenza, and the patient was treated at home for ten weeks. About three weeks ago pain began in the left ear and after three days spread to the frontal, temporal and occipital regions. On August 13 the patient vomited immediately after taking food. There had been no previous stomach pain and the vomited food was unchanged. The vomiting continued and also the headache. For the last three weeks the patient has slept badly and has lost much flesh. He has also suffered from constipation. Dr. Power examined the patient August 21, and found a normal knee jerk on the right side, but a greatly diminished one on the left. The optic discs appeared to be blurred. Patient stated that he had had discharge from the left ear for fifteen years following scarlet fever.

Examination by J. S. F. at Victoria Hospital, August 25. Temperature and pulse subnormal. Patient lies on his back in bed. He complains of headache, which at times is so severe as to make him call out. The left meatus contains foul

smelling pus and cholesteatoma, but there is no mastoid tenderness. With the noise apparatus in the right ear patient is quiet deaf. Weber lateralized to the right (good) ear. There is spontaneous horizontal nystagmus both to right and left, but none on looking straight forward. The pointing test shows a deviation to the left at the left wrist and shoulder joints. With the right hand the patient points almost correctly. Cold syringing of the left ear produces no increase in the spontaneous nystagmus to the right. Patient too ill for Romberg test. The grasp by the right hand is much stronger than that of the left, but the patient is a right handed man.

The case was regarded as one of chronic suppurative otitis media in which a recent attack of labyrinthitis had occurred and in which cerebellar abscess was probably present. The patient expressed his willingness to submit to operation and was accordingly removed to the Royal Infirmary.

Operation, August 25.—Radical mastoid operation, left ear. Cortex sclerotic. Antrum large and filled with cholesteatoma. Malleus and incus absent. Sinus exposed and found healthy. Dura of posterior fossa separated from the bone in an inward direction towards the internal meatus. Neumann's labyrinth operation performed, opening up the posterior and lateral canals; vestibule freely opened behind the facial nerve. Promontory removed. Dura of triangular area split up and cerebellar abscess evacuated just behind the position of the mastoid antrum. As the drainage obtained through this opening did not appear to be sufficient a transverse incision was made backwards from the original incision and the cerebellar dura exposed behind the sinus. In doing this the sinus was accidentally opened and the bleeding greatly interfered with further attempts at operation. The idea of a counter opening behind the sinus was therefore abandoned. The cerebellar abscess was lightly packed with strips of bismuth gauze and the operation cavity left open.

The patient died in the evening after operation from interference with respiration. Towards the end the pulse rate rose from 70 to 130, but the temperature continued subnormal.

Postmortem.—Skull cap very thin, convolutions flattened. The small abscess in the left lobe of the cerebellum has been drained, but there is marked edema around it. The brain as

a whole is very edematous—the pons Varolii being markedly affected. There is no apparent meningitis.

Microscopic Examination.—Cholesteatoma is seen on the inner wall of the attic and aditus. The most interesting feature of this case is the presence of thrombosed vessels passing through the fossa subarcuata from the inner wall of the antrum to the posterior fossa. The facial nerve is intact throughout. The cochlea appears healthy. The vestibule has been opened up and contains blood and chips of bone. The internal meatus shows little signs of meningitis. The lateral semicircular canal has been opened up by the operation. In the superior canal the perilymph space contains pus and blood.

Case 26.—C. O. M. S., with Cholesteatoma. Labyrinth apparently Healthy, but Meningitis probably Present on Admission. Radical Mastoid Operation; Extradural Abscess in Middle and Posterior Fossæ; Symptoms of Meningitis Increased and Translabyrinthine Drainage therefore Carried out; Coma; Death.—No. 457. W. G——, male, aged nineteen, was first seen on August 10, 1917, suffering from deafness in and discharge from the left ear since measles in childhood. Patient joined the army in 1914 and had been in four hospitals on account of his ear condition. He was discharged from the army in January, 1916. He has all along refused to have his ear operated upon. One week before admission earache and headache began.

On admission temperature 99° F., rising to 103° F. in the evening; pulse 90 to 100; respirations 26. The left meatus was blocked by a polypus surrounded by pus. There was slight projection of the left auricle. The right meatus contained wax. Patient could only hear raised voice close to the left ear with noise box in good ear, but tuning fork tests showed only middle ear deafness. Marked spontaneous nystagmus to the diseased side and also upwards, but no pointing error and no giddiness; no fistula symptom. Tongue moist, but furred. No vomiting; Kernig's sign absent; knee jerks present; plantar response to Babinski's test. Patient mentally bright and could recognize and name at once objects shown to him.

August 11: Operation.—Lumbar puncture performed first of all. Cerebrospinal fluid under great pressure, but clear.

(Report from Pathology Department. Small number of polymorphs, but no organisms seen. No growth on culture.) Radical operation on left ear: Cortex normal; mastoid sclerotic; emissary vein far forward and apparently thrombosed. Antrum large and full of cholesteatoma and pus; pus in cells between sinus and antrum, also between bone and dura in middle fossa. Ossicles markedly eroded; tympanum full of granulations; lateral canal healthy; cholesteatoma in attic. Vestibular apparatus did not respond to cold lotion on operating table. Dura of middle fossa showed some granulations. Anterior wall of sigmoid sinus also appeared red, rough and thickened, but no obvious perisinus abscess. Operation cavity packed with hypertonic saline gauze; wound left open.

August 12: Temperature 100° F., pulse 60, respirations 20. Nystagmus to left (diseased side still continues, but upward nystagmus absent; no vomiting. Superficial dressings changed. August 13: Patient not so well. Headache and vomiting present. Pulse 68, temperature 99° F. Patient had to have heroin last night. Lumbar puncture performed today under ethyl chlorid general anesthesia; cerebrospinal fluid under great tension and almost purulent (films showed diplococci; no report on culture).

Second operation at 12 noon today. Dura of middle and posterior fossæ further exposed; labyrinth operation with drainage of internal meatus; silver wire inserted; foul, purulent fluid came from internal meatus. Dressings applied. 10:30 p. m.: temperature 100.6° F., pulse 78, respirations 30. Third lumbar puncture: 10 c. c. of antistreptococcal serum injected. August 14: Temperature 100.4° F., pulse 70, respirations 28. Patient has required frequent injections of morphia during the night. Wound dressed. Pus flowing from opening into internal meatus; facial paralysis present; dura covering left temporosphenoidal lobe incised to relieve tension. Patient became unconscious at 5 p. m. Temperature rose to 103° F. at 8 p. m., pulse 104, and patient died at 10:45 p. m. Unfortunately the parents refused permission for a post-mortem.

Remarks.—This case again illustrates the danger of delay in operation on cases of chronic foul smelling middle ear suppuration. From 1914, when the patient joined the army at

the age of sixteen years, up to January, 1916, when he was finally discharged from the army, he was on four occasions in hospital on account of his ear condition, but always refused an operation. It was only after he had suffered from pain and headache for one week that he came into the Royal Infirmary. Examination on admission showed chronic suppuration on the left side, with polypus, but an apparently healthy labyrinth. The patient's general symptoms, however, pointed to meningitis—e. g., headache, spontaneous nystagmus to the diseased side, and a cerebrospinal fluid under tension and containing polymorphs. Operation showed cholesteatoma in the attic and antrum and pachymeningitis in the middle and posterior fossæ. The labyrinth appeared healthy. Unfortunately the radical mastoid operation was not followed by improvement, the symptoms of purulent meningitis rapidly developed and lumbar puncture showed that the cerebrospinal fluid had become purulent. Translabyrinthine drainage evacuated foul smelling pus from the internal meatus. The patient rapidly became comatose and died. As permission for an autopsy was refused it was not possible to determine the route of infection. All along the symptoms did not point to a septic thrombosis of the sigmoid sinus or to brain abscess, but it is impossible to state with certainty that these conditions were not present.

Case 27.—C. O. M. S. (Bilateral); Recent Injury to Occipital and Mastoid Region on Left Side, Followed by Headache; Vomiting and Giddiness; Radical Mastoid Operation on Left Side; Extradural Perisinus Abscess found; Later, Symptoms of Meningitis or Cerebellar Abscess Developed, Followed by Coma. Second Operation: Left Sigmoid Sinus Found to be Thrombosed and therefore Slit up; Dura Covering Cerebellum opened and Pus Evacuated from Surface; No Abscess of Cerebellum. Death. Postmortem.—No. 403. A. W—, male, aged eighteen, railway porter, was admitted August 6, 1916, with a history of discharge from both ears of at least two years' duration. A week before admission patient got a blow on the left side of his head in the occipital region from a piece of coal and was unconscious for a time afterwards. He did not vomit on recovery but some hemorrhage from the left ear was noted at the time. Since this accident the patient has

complained of headaches and has vomited occasionally. He has also complained of giddiness and states that external objects have appeared to rotate. No history of rigors was obtained.

Examination.—Temperature 99.4° F., pulse 80. Patient holds his head inclined to the left side and there is marked mastoid tenderness on this side. The external meatus on both sides contains pus, and on the left side a polypus is present. The right drumhead shows a perforation in the posterior part through which cholesteatoma protrudes.

Functional Examination.—Cochlear apparatus: Schwabach lengthened. Weber not lateralized. Rinne negative on both sides. Conversation voice heard by the right ear at 15 inches. With the noise apparatus in the right ear the patient can hear the raised voice at 10 inches. Vestibular apparatus: No spontaneous nystagmus; no pointing error; no Rombergism; rotation and caloric tests not carried out on account of the patient's condition.

There is slight spasticity of both legs, especially the right one. The right knee jerk is exaggerated and ankle clonus is present on this side. There is narrowing of the fields of vision in the upper and outer quadrant on both sides.

First operation at 3 p. m. on day of admission. Radical operation on left ear. Cortex normal. Mastoid sclerotic. Cholesteatoma in antrum. Large foul smelling extradural abscess in posterior fossa around the sigmoid sinus. Films from the pus showed many organisms: Gram positive diplococci predominate, but there are also Gram negative diplococci and bacilli. On culture Gram positive and also Gram negative diplococci along with Gram positive and Gram negative bacilli were obtained. The perisinus abscess had no direct connection with the antrum. The radical operation was completed: the malleus and incus were removed and found to be eroded. The tympanum was full of granulations but the prominence of the lateral canal and also the promontory appeared healthy. The wound was lightly packed and left open. Lumbar puncture was performed at the end of the operation and showed cloudy cerebrospinal fluid under great tension. In films many polymorphs were seen along with a few Gram positive and Gram negative diplococci, both intra- and extra-

cellular. No growth was obtained on culture. A blood culture was also taken at the end of the operation but no growth was obtained in this. August 7: Temperature 98° F., pulse 76. Patient appears to be doing well. August 10: Temperature 97° F., pulse 60. Patient has had a restless night and complains of headaches. He attempted to get out of bed during the night and had to get heroin. August 11: Temperature 97° F., pulse 54. The tongue is dry and brown. Patient again had a restless night and frequently broke into song. The head is retracted and optic neuritis is well marked today. There is marked rotatory nystagmus to the left (side of operation). At 5:30 p. m. the breathing developed the Cheyne-Stokes character. Patient almost comatose. Incontinence present. Marked tache cerebrale. Kernig positive. Lumbar puncture evacuated turbid fluid under pressure. Films showed many degenerated cells and a Gram positive diplococcus along with a Gram positive bacillus. No growth was obtained on culture.

Second Operation.—Almost no anesthesia was required but artificial respiration had to be kept up during the earlier part of the operation. An incision was made backward and downward from the center of the retroauricular wound. The dura of the cerebellar fossa was exposed by further removal of bone and slit up. The sigmoid sinus, which was found to be thrombosed, was included in the incision. Two teaspoonfuls of pus were evacuated from the subdural space, but, on incising the cerebellum, pus was not obtained. After the relief of pressure natural respiration restarted. August 12: The patient died at 9 a. m.

Postmortem.—Congestion of meninges and flattening of convolutions. There is a purulent infiltration on the surface of the left lateral lobe of the cerebellum at the junction of the superior and posteroinferior surfaces. This superficial abscess was adherent to the dura, which was covered by a layer of fibrin. The pus in the abscess had a foul odor. The thrombosis of the sigmoid sinus did not extend beyond the mastoid. The pus from the superficial abscess of the cerebellum yielded on culture a Gram positive diplostreptococcus and a Gram negative motile bacillus. The cultures had a foul odor.

It is unfortunate that the postmortem report does not state whether there was a fracture of the occipital bone just below

the level of the lateral sinus in the position of the superficial purulent infiltration of the cerebellum.

Microscopic Examination.—The cochlea is healthy as are also the membranous structures in the vestibule. There is no meningitis in the internal meatus. There is hemorrhage in the perilymph space of the posterior canal just at the ampullary end. This hemorrhage appears to have come from the jugular bulb and to have extended from the ampullary end of the posterior canal into the perilymph space of the vestibule, and also along the smooth end of the posterior canal into the crus commune. It is possible that the condition of the labyrinth was due to injury at operation on the large extradural abscess in the posterior fossa around the sigmoid sinus. There is a recent clot in the jugular bulb.

Remarks.—In the operator's opinion this case was not one of cerebellar abscess, but rather of circumscribed purulent meningitis in the posterior fossa following injury in the presence of middle ear suppuration with cholesteatoma. Death was due to the circumscribed meningitis becoming general.

Case 28.—C. O. M. S. (Right); Complicated by Recent Injury and followed by Giddiness and Vomiting. Temporosphenoidal Lobe Trephined by General Surgeon, but no Abscess; later, Rigors; Right Labyrinth Functionless and Facial Paralysis Present. Radical Mastoid Operation (J. S. F.). Fistula in Lateral Canal; Extradural Abscess in Posterior Fossa. Neumana's Labyrinth Operation; Sinus Opened, but no Obvious Thrombosis; later, Double Optic Neuritis and Rigors, with Signs of Cerebellar Abscess. Third Operation: Cerebellum Explored with Negative Result; Right Internal Jugular Ligatured; Slow Recovery; Three Months later Cerebellar Hernia Ruptured. Fourth Operation: Cerebellum Investigated with Negative Result; Death from Meningitis.—No. 192. T. M—, male, aged thirty, first seen by J. S. F. in a general surgical ward April 17, 1913, with a history of discharge from the right ear for fifteen years. Seven weeks before admission patient, who is a miner, met with a head injury in the pit. The next day the discharge stopped and frontal headache began. Patient also had pain in the right ear and right occipital region. He continued to work for about seventeen days, but then sickness and vomiting set in

and the headache became worse. Three days later he became giddy and tended to fall forward. He was admitted to one of the general surgical wards (Royal Infirmary, Edinburgh), March 28, and four days later the right temporosphenoidal lobe was trephined, but nothing was found (first operation). The headache improved after this until four days ago (April 13), when patient began to complain of pain in the right ear with giddiness and nausea. Last night he had a shivering attack and this morning he vomited. For the last four days his temperature has been elevated.

Examination.—Right external meatus contains foul smelling blood stained discharge. After syringing there is bulging of the posterior meatal wall, beyond which granulations can be seen. Mastoid tenderness present. Slight facial paresis on right side. Temperature 97.8° F., pulse 68.

Functional Examination.—Cochlear apparatus: Weber lateralized to left (good) ear. Rinne absolutely negative on right side. Tuning forks not heard by air conduction by right ear. With noise apparatus in left ear patient is quite deaf. Vestibular apparatus: Slight nystagmus to left and also to right, normal (?) Rombergism towards the right and backwards. No fistula symptom. Cold caloric test negative on right side after three minutes. Rotation not tested.

April 20: Patient admitted to Ear and Throat Department today. Temperature 101.4° F. at 8 p. m. Pulse 100. Patient lies on his back and is mentally bright. He sleeps well and answers questions promptly. Memory good. No restlessness. No headache. Pupils equal, react to light and accommodation. No signs of meningitis. Grasp equal on both sides. Pronation and supination test good. Smell and taste normal. No pain on percussion of skull or spine. Slight emaciation. No jaundice or enlargement of spleen.

Second Operation (J. S. F.).—Right mastoid cortex presented deep hollow filled with fibrous tissue. Antrum small and deep, contained mucoid pus. Malleus and incus not found. Lateral canal markedly eroded and facial nerve hanging free for a short distance. Oval window found empty. Neumann's labyrinth operation performed. In exposing sinus extradural abscess opened. Sinus wall showed granulations. Sinus traced

back till healthy wall reached and slit up; no obvious thrombosis. Jugular vein not ligatured.

April 22: Temperature last night 99.4° F., pulse 76. Today, temperature and pulse normal. Patient lies on left side. Slight nystagmus to left. The facial paralysis is now complete. April 25: Temperature subnormal. Nystagmus to left continues. Vomiting has passed off. Wound dressed today. No bleeding from sinus. Good reaction in wound. April 28: Vomiting continues; frontal headache; nystagmus to left and slight giddiness. Coordination good. Emaciation more marked. April 30: Temperature about 101° F. for last three days, pulse 68. Rigor this afternoon. Temperature 103° F. Dr. Sym reports double optic neuritis. Tenderness and swelling along right sternomastoid. Tongue dry and brown. Patient refuses consent to further operation. Frontal headache continues. May 3: Headache and vomiting continue. Rigors on May 1 and 2. May 7: Patient rather better, but evening temperature still elevated. Rigor on May 5. Today patient examined by Dr. Edwin Bramwell, who found some incoordination of right upper extremity. Nystagmus to left. Grasp equal on both sides, though patient is right handed. Slight tremor of the right hand. Dr. Bramwell considered that these signs were suggestive of cerebellar trouble.

Third Operation (J. S. F.).—Free bleeding obtained from torcular end of sigmoid sinus. No bleeding from bulb end. Tip of mastoid removed and sinus slit up almost to the bulb, but only slight bleeding obtained. Right internal jugular vein ligatured, the portion above the common facial being thrombosed and thickened. Crucial incision in cerebellar dura through the posterior wall of the sinus. Some turbid fluid with a slightly foul odor escaped. (Staphylococcus aureus and a diphtheroid bacillus on culture.) Right lobe of cerebellum explored with negative result. May 8: Temperature 101.8° F. last night after operation, pulse 124. Patient had a good night. No rigor. No vomiting today. May 10: Temperature last night 102.4° F. No headache or vomiting. Wound dressed. Free bleeding from torcular end of sinus and a little from the bulb end. Slight hernia cerebelli. May 15: Temperature rises each evening to about 102° F. Attempt to syringe through bulb not successful. Patient com-

plaints of frontal headache. Cerebellar hernia larger. Lumbar puncture shows clear fluid not under tension. May 20: Headache persists and is only relieved by heroin. Patient vomited thrice last night. During last four days temperature has fallen to normal. Pulse 94. Hernia cerebelli still increasing. May 25: Evening temperature has risen to about 100° F. during the last five days, but vomiting and headache have been absent. Appetite good. Tongue clean and moist. Patient is getting brandy and says that it is doing him good. May 31: After being normal for four days temperature rose to 102° F. yesterday. Patient, however, feels well. June 12: Temperature between 97 and 98 degrees F. since last report. Patient has been up for a week. The hernia cerebelli is smaller and the neck wound is healed. The wound behind the right ear is doing well. July 23: Both wounds are now quite healed. Patient sent to Convalescent House. August 3: Patient sent back from Convalescent, as he had a bad night after a supper of salmon, cheese and hot jam! Patient vomited and had a slight rise of temperature. On admission today temperature 98° F., pulse 60. There is slight bulging of the wound behind the right ear. August 8: Doing well. No headache or vomiting. The cerebellar wound does not bulge. August 15: Patient discharged. August 29: Patient reports, complaining of dizziness but no vomiting. His appetite is good and he sleeps well. On standing with eyes shut he tends to fall to the diseased side. There is no spontaneous nystagmus, but there is a pointing error to the right with the right hand, and there is considerable bulging over the cerebellar scar. No signs of meningitis. Field of vision normal and fundus normal on both sides.

October 5: Patient again reports. There is now a hole in the thin skin over the cerebellar hernia and from this clear cerebrospinal fluid drips. Patient states that this condition has been present for five days. Patient is getting fat and has been contemplating returning to his work in the mine. He was advised to come in for observation, but refused to do so. October 8: Patient admitted. Temperature 99.6° F., pulse 92. Violent fit of shivering this afternoon. Severe pain over right side of head. Temperature 102.8° F., pulse 100. Great flow of fluid from the cranial wound. Slight nystagmus to

diseased side. Fundus normal on both sides. No stiffness of neck. No Kernig. Patient very excited.

Fourth Operation.—Lumbar puncture showed clear fluid under slightly increased tension. No increase in cells and no organisms. Right lobe of cerebellum investigated with negative result. October 10: Temperature remains about 102° F. Patient is restless and vomits frequently. He is getting morphia. October 12: Death.

Postmortem.—Convolutions flattened. Vessels congested. Thick, creamy exudate at the base and extending down cord. Right lobe of cerebellum somewhat disintegrated, but no abscess.

Microscopic Examination.—The cavity formed by the radical mastoid operation is lined by squamous epithelium. The facial nerve is incorporated in the fibrous tissue on the inner wall of the tympanum. The hollow spaces of the cochlea contain pus and granulation tissue, with some new bone formation. The saccule and utricle are not to be seen and the vestibule is filled with granulation and fibrous tissue. The meningitis in the internal meatus has passed into the stage of granulation tissue formation in which the nerves are embedded. The bone surrounding the labyrinth is very vascular (paralabyrinthitis). The jugular bulb is thrombosed; the thrombus has become organized into fibrous tissue.

Remarks.—Although the symptoms and signs in this case pointed to the presence of a cerebellar abscess, this condition was not found. The patient apparently had localized leptomeningitis in the posterior fossa in addition to extradural abscess and probably sinus thrombosis. After the third operation he made a slow recovery. The septic condition of the posterior cranial fossa on the right side had, however, not been completely eliminated, and the patient returned with leakage from the cerebellar hernia. He was urged to stay in hospital, but refused to do so. Death was due to the spread of an apparently hitherto localized meningitis.

Case 29.—Chronic Middle Ear Suppuration (Right). Radical Mastoid Operation: Extradural Abscess in Middle Fossa; Circumscribed (?) Labyrinthitis; Serous Meningitis with Organisms in Cerebrospinal Fluid; Thrombosis of Superior Petrosal and Cavernous Sinus; Bacteremia; Sigmoid Sinus

Explored; Temporosphenoidal Lobe Investigated; Death. Postmortem: Meningitis, Abscess in Lung and Empyema.—No. 322. J. W——, male, aged ten, admitted August 14, 1915. The patient has had discharge from the right ear for years. A week ago the discharge stopped, and the patient complained of earache and headache and held his head tilted to the right side. For two days he has suffered from shivering and vomiting.

Examination.—Temperature 104.3° F., pulse 160, respirations 44. Patient is rather drowsy. The tongue is dry and furred. Left drumhead indrawn and opaque. Right external meatus full of fetid pus. Schwabach lengthened. Weber to right (worse) ear. Rinne negative right side. Patient can hear with his right ear; noise apparatus in left ear. No spontaneous nystagmus. Vestibular tests not carried out, as patient is too ill.

First operation a few hours after admission. Right mastoid abscess sclerotic. Foul pus under pressure in antrum. Large extradural abscess in middle fossa with granulations on dura. (Films of the pus showed Gram positive and also Gram negative diplococci. In addition there were Gram positive and also Gram negative bacilla.) Sinus exposed with the gouge and appeared healthy. Radical operation completed. Malleus and incus absent. Bony wall of external canal eroded. No reaction to cold lotion under the anesthetic. Labyrinth operation not performed in view of retention of cochlear function. Lumbar puncture at the end of the operation evacuated fluid which was almost clear but under slightly increased tension. (Cultures from the fluid yielded Gram negative diplococcus and a Gram negative bacillus.)

Progress.—At 8 p. m. on the day of operation temperature 102.6° F., pulse 120, respirations 18. Patient lies with legs drawn up. No restlessness or irritability but Kernig's sign present on both sides, and the boy complains of pain if the head is moved or if pressure is made on the cervical spine. The left eye is prominent and pressure on the eyeball causes pain. The left pupil is larger than the right. August 15: At 8 a. m. temperature 102.8° F., pulse 116, respirations 26. Margins of right optic disc are indistinct. There is divergence of the right eye and also slight horizontal and rotatory nystagmus

to the left. August 16: Temperature 101.4° F., pulse 128, respirations 60. The patient is more drowsy. The spleen is not enlarged, but there is dullness at the left base. A blood culture was taken, and the report (received two days later) stated that films showed diplo- and streptococci and bacilli. No growth was obtained.

Second Operation.—The right temporosphenoidal lobe explored on account of condition found at first operation. Negative result. The sigmoid sinus was split up but was found to contain only fluid blood. August 17: At 8 a. m. temperature 101.4° F., pulse 120, respirations 44. Patient in statu quo. At 8 p. m. temperature 103° F. August 18: Temperature 102° F. at 8 a. m., pulse 160, respirations 60. There is marked edema of the eyelids on the right side with ptosis and dilatation of the right pupil. The boy cries out at times and then relapses into a comatose condition. Death at 8 p. m.

Postmortem.—Septic thrombosis of superior petrosal and cavernous sinus on the right side. Early stage of same condition on left side. Leptomeningitis limited to base of brain. No abscess of brain. Examination of the chest showed multiple abscesses in the lung with double empyema. Toxic changes were observed in the heart, kidneys, liver and spleen. Early pericarditis was noticed.

Remarks.—The operator believes that before the admission of the patient to hospital, meningitis and septicemia were already present in addition to extradural abscess and circumscribed labyrinthitis, or, in other words, that the case was hopeless. Symptoms of cavernous sinus thrombosis were already present before the second operation, during which the portion of the sigmoid sinus below the upper knee was found to contain fluid blood. Septic thrombosis of the superior petrosal and cavernous sinuses may have been due to infection via the veins from the petrous bone. Unfortunately the condition of the jugular bulb does not appear to have been investigated at the postmortem. In view of the condition of the lungs, pleural cavities and pericardium, it would appear probable that there was septic thrombosis of this region.

LII.

CONSERVATIVE SURGERY OF THE LATERAL SINUS.*

By C. C. JONES, M. D.,

CINCINNATI.

During the last few years I have been very much interested in the treatment of thrombosis of the lateral sinus. After having had several cases and having made a study of the literature on the subject, I reached the conclusion that opinion as to the correct surgical procedure varies a great deal, and an operator can find good authority for almost any operation that he cares to perform. I also reached the conclusion that it is a much more frequent complication of otitis media than is generally supposed.

In this paper I give the result of my study of the subject along three different lines, and then state the conclusions deduced.

1. A study of the literature and a collection of fifty case reports with an analysis of them.
2. The summary of the answers to a questionnaire sent to one hundred of the leading otologists of the country.
3. My own case reports.

1. I am fully aware of the fact that a tabulation of case reports selected from the literature is not of as much value as a report of consecutive cases, because of the tendency to report only successful cases. In the following statistics I have not attempted to tabulate any symptoms or the preoperative diagnosis, because the symptoms can be found in any textbook on the subject, and the ability to make a diagnosis from the symptoms found depends on the individual.

(See Chart 1.)

*Candidate's thesis for membership in the American Laryngological, Rhinological and Otological Society, read by title at the meeting June 6, 1919, in New York City.

A study of these case reports will reveal the following points:

1. The condition occurred mostly in young persons, the oldest being 40 years of age, while the average age was $18\frac{1}{4}$ years.

2. It occurred as frequently in acute as chronic otitis, twenty-six cases resulting from acute otitis and twenty-four cases from chronic otitis.

3. In thirty-five cases the thrombus was present and discovered at the primary operation on the mastoid. In 13 cases it followed the mastoid operation and in two cases no operation was performed.

4. The jugular vein was resected in sixteen cases. In nineteen cases it was ligated and in fifteen cases it was not treated.

5. Forty-three cases recovered and seven died.

- a. In the thirty-five cases where the vein was either ligated or resected five died, $14\frac{2}{7}$ per cent.

- b. In twenty-one cases the sinus was opened and the jugular ligated or resected afterwards; three died, $14\frac{2}{7}$ per cent.

- c. In the fifteen cases where the jugular vein was not treated surgically two died, or $13\frac{1}{3}$ per cent.

- d. In the thirty-five cases where the vein was exposed for surgical treatment it was found collapsed in eight cases.

- E. A. Crockett reported sixty cases from different operators in which the vein was ligated before or immediately after opening the sinus. Nine cases died, making the death rate 15 per cent.

Kopetzky, "Surgery of the Ear," publishes a report of 308 cases collected by Körner.

Ligature of jugular without opening sinus: 9 cases; 4 died, 5 recovered.

Sinus opened without ligation of jugular: 132 cases; 55 died, 77 recovered.

Ligature of jugular before opening sinus: 94 cases; 36 died, 56 recovered.

Ligature of jugular after opening sinus: 68 cases; 29 died, 38 recovered.

Ligature of jugular and sinus opened, order not stated: 5 cases; 1 died, 4 recovered.

The percentage of recoveries in the 132 cases where the sinus alone was treated was 58.3. The percentage of recoveries in the 167 cases where the jugular was ligated just before or after the treatment of the sinus was 58.6.

C. J., age seven, was seen in consultation with Drs. Gumley and Greenebaum on May 31, 1917. The history of the case showed that five weeks previous the patient had a bad cold, followed by a severe earache in the right ear. He was taken to a hospital, a paracentesis performed on the right ear and the following day the left ear began to discharge. The ears discharged for three days and then stopped entirely. The patient continued to have an afternoon temperature, which continued to rise higher each day. At the end of four weeks the parents were told that the patient had tuberculous meningitis and advised that he be taken home, as treatment was useless.

The patient was well developed but very much emaciated. He was in semistupor and could not answer questions intelligently. Pupils widely dilated but reacted to the light. Knee jerks exaggerated, Kernig's sign absent. No rigidity of the neck. Was hard to elicit tenderness on account of the patient's mental condition, but there was apparently a slight amount over the right mastoid, in the region of the emissary vein. External canals of both ears were normal. There was only a very slight redness around the periphery of the right drum. The temperature was 104, pulse 110. Examination of chest and abdomen was negative. Unable to get any history of chill having occurred at any time during sickness. Patient ordered to the Cincinnati General Hospital, where an X-ray examination was made. The report was very slight cloudiness of both mastoid processes, but no bone destruction. Blood count showed a leucocytosis of 11,000, polymorphs 86 per cent. Spinal puncture was made and the fluid escaped under slightly increased pressure, but was otherwise normal. On the history the septic temperature, the leucocytosis, and a diagnosis by exclusion, a diagnosis of thrombosis of the lateral sinus was made. It was decided to operate the right side first because of the slight tenderness.

A simple mastoid operation was performed and a few of the upper posterior cells contained thick granulation tissue and

a very small amount of pus. The lateral sinus was then exposed and found to be covered with granulation tissue. The sinus was thrombosed down near the bulb, above that it fluctuated. The sinus wall was then incised and about two drams of thick yellow pus escaped, and after curetting it bled freely from the torcular end but not from the bulb. An incision was then made in the neck and a very small collapsed jugular was ligated by Dr. J. Ransohoff. The patient was returned to bed and made an uneventful recovery, the temperature at no time going above 100.5.

Blood culture made the day following operation was negative. The pus that escaped from the sinus was almost a pure culture of staphylococci.

Casell, A. L. (by courtesy of Dr. J. W. Murphy). 25 years, female, housewife, was admitted to the Cincinnati General Hospital on Feb. 3, 1917. Family history negative. Ordinary diseases of childhood. Typhoid at 24. Has had malaria. On Jan. 29th she felt bad and had a severe headache. Jan. 30th she had severe pain in her right ear, which continued until she came to the hospital on February 3. The ear ruptured while she was in the receiving ward. Upon examination, the right external canal was found to be filled with mucopus. There was a large perforation of the posteroinferior quadrant of the drum. A paracentesis was made to enlarge the opening and three hourly irrigations with hot bicarbonate solution. Temperature 104, pulse 130, respirations 24. Percussion note over apex of right lung impaired, and the breathing was bronchovesicular in character. Urine negative.

February 5. No change; the temperature varied from 98 to 103.5.

February 6. Temperature remains between 102 and 103.

February 8. Patient complained of feeling chilly and then had a profuse sweat, but the temperature only reached 101.5.

February 9. Very profuse discharge from the ear and temperature reached 104.

February 11. Examination of the blood for malaria negative. Blood culture negative.

February 16. Patient complained of some tenderness in the region of the right mastoid; slight tenderness and very small

amount of discharge from the ear. Blood culture negative. Temperature 102. A mastoid operation was decided on. A simple mastoid operation was performed, and there were a few broken down cells and some pus. Sinus was exposed but was apparently normal.

February 17. Patient in good condition. Temperature normal.

February 22. Patient had a severe chill followed by a temperature of 104.5.

February 23. Patient had another chill with elevation of temperature. Operation and removal of granulation from the lateral sinus exposed a thrombosed sinus. The thrombus was opened and the thrombus removed. An incision was then made in the neck and a collapsed jugular vein ligated. Two weeks later the patient developed a pleural empyema on the right side, which was drained by a rib resection. Following this she made an uneventful recovery.

All blood cultures were negative, but a culture from the thrombus showed the presence of a staphylococcus.

Case 3.—J. C., a well developed white male, age thirty-eight years, was admitted to the Cincinnati General Hospital on March 10, 1918, complaining of very severe pain in the left ear. Gave history of having had earache when ten years of age, but not since until the present attack started one week ago. He always had a slight foul discharge from the ear. Five days ago he was seized with a very violent headache that has continued up to the present time. Family history negative. Eyes, nose and throat normal. Physical examination of chest and abdomen negative. Temperature 102, pulse 110. The canal of the left ear filled with profuse, very foul smelling, bloody discharge. The tympanic cavity is almost entirely destroyed. A large amount of cholesteatoma could be dislocated from a large opening in the posterior wall of the canal. The mastoid process was not tender to pressure, but there was a great deal of tenderness along the anterior border of the sternomastoid muscle, and a well defined mass could easily be palpated beneath the muscle. Shortly after admission the patient had a hard chill followed by a temperature of 104.2 and a profuse sweat. Patient was taken to the operating room at once. The mastoid process was opened and the bone was

very sclerosed. The antrum was found to communicate with a very large cavity in which the lateral sinus lay in a state of necrosis, the anterior wall having been completely destroyed. All the necrotic sinus was cleaned away and the torcular end curetted until there was free bleeding. The wound was then packed, no attempt being made to perform a radical operation because of the critical condition of the patient. A thrombosed jugular vein was then resected all the way to the clavicle, the wound closed and the patient returned to bed. All efforts to stimulate the patient were of no avail, as he continued to run a very high, irregular temperature, rapidly became comatose and died two days later.

A blood culture taken before the operation showed numerous colonies of a gram positive staphylococcus. Wassermann test negative.

The following is the report of the autopsy, performed by Dr. P. G. Wooley:

PATHOLOGIC REPORT.

"The body was that of a white adult male, about thirty-five years of age, well developed and well nourished. Postmortem lividity was well marked and rigidity was fairly well marked. The pupils were unequal, the left slightly larger than the right. The teeth were in poor condition. Over the mastoid on the left side was a large incision. Over the neck below the hyoid bone, running vertically toward the jugular notch, was an incision about three inches long in which there was packing. The whole area was necrotic.

Upon removal of the skull the pia was intensely congested and the whole brain exceedingly edematous. In the temporal lobe, immediately over the roof of the middle ear, was an abscess penetrating directly into the temporal lobe for about one-half inch and about one-half inch in diameter. There was no other evidence of abscess within the brain. In the top of the petrosa bone, immediately over the middle ear, was a small perforation exuding pus from the middle ear. Upon removal of the roof, the whole middle ear was filled with heavy, thick, yellowish pus. On the left side the lateral sinus had been opened. The entire sigmoid portion of the sinus backward along the sinus to where it joined with the right

portion was entirely thrombosed. The sphenoid and ethmoid sinuses were entirely free from infection.

Upon opening the thorax the lungs did not collapse, were considerably edematous and congested. The pleural cavities each contained about 100 to 200 c. c. of a dark greenish blue fetid fluid. The left lung, upon section, showed several small abscesses. One of these near the pleura had burrowed through the pleura and drained in the thoracic cavity. The right lung contained two rather large cavities full of thick yellowish black fluid. In the left lower lobe was a large infarct about 8 c. m. in diameter, which was infected.

The abdominal cavity contained no fluid. The bowels were considerably distended with gas. The liver was large, yellowish and soft. The gall bladder was free of any stones or signs of cystitis. The intestinal tract was normal. The spleen was large and soft, and contained about four or five infarcts. The kidneys were rather large, soft, the capsules stripped easily, the stellate veins were injected. The cortices were rather pale, and the medullæ about normal in color. Upon section, the cut edges everted markedly."

Case 4.—G. R., age eighteen months, was seen by me in consultation with Dr. W. S. Yeager of Oakley, on July 6, 1915. The history was that the right ear had been discharging for about six weeks without causing the child any distress until the day before, when she had a chill, a high temperature and seemed to the mother to be in a stupor. Upon examination I found the patient to be a well developed girl baby. She gave the impression of being very sick. Ear examination: The canal of the right ear was filled with thick, creamy pus. The tympanic membrane and the posterior wall of the canal were both bulging. Upon pressure over the mastoid the child winced and cried. Temperature 102.5, pulse 120. A free paracentesis was performed, and the child ordered to the Bethesda Hospital. The following morning the patient had a paralysis of the right side of her face. Temperature, 103. It was decided to operate at once. Simple mastoid operation, and the whole process was found necrotic and filled with pus and granulations. The sinus was exposed and found to be thrombosed. It was laid open, the clot turned out and bled freely from both ends. Both ends were then packed with iodoform

gauze saturated with alcohol and the mastoid cavity left entirely open and lightly packed. Care was taken to make the operation very complete around the antrum because of the facial paralysis. The case made an uninterrupted recovery and the facial paralysis completely recovered in three months.

Studying these four case reports, we find that three recovered and one died. The pathologic report on the fatal case proves that he would have died regardless of any treatment that might have been instituted. Of the three cases that recovered, the jugular was ligated in two cases, in both of which it was collapsed. From a personal study of the cases before, during and after the operations I feel confident that the recovery would have been just as rapid in both cases had the jugular not been ligated.

A questionnaire was sent to one hundred of the leading otologists of the country and the following questions were asked:

1. With the symptoms of sinus thrombosis which do you do first, expose the sinus or ligate the jugular?
2. Sinus exposed and thrombosed. Which would you do first, open it or ligate the jugular?
3. Sinus opened and no bleeding from the bulb. Would you ligate the jugular?
4. Thrombus removed and free bleeding from both ends. Do you ligate the jugular?
5. Do you ever treat the torcular end of the sinus?
6. Do you ever expose the bulb?
7. When do you excise the vein and when ligate it?

Out of the number only nineteen responded, due to the fact that so many were in military service. Their answers are tabulated in chart 2.

A study of this chart shows that ligation of the jugular in thrombosis of the lateral sinus is practiced almost universally by otologists.

I believe that thrombus of a blood vessel is an attempt on the part of nature to prevent the infection from entering the blood stream. How successful this attempt depends on the virulence of the infection and the resistance of the patient. When the infection is not arrested by the thrombus we have the severe cases of general septicemia with local pyemic man-

ifestations through the body. I think that usually the infection has been temporarily arrested by the thrombus, and all that is needed in a surgical way is the opening of the sinus walls permitting the contents to escape, when the thrombus begins to disintegrate. After a thrombus has formed in the sinus and the blood clot obliterated, I believe that there is as much danger of systemic infection from the torcular end as from the jugular end. We must always remember that any operative interference is of value in so far as it assists nature and becomes an actual menace when it is so radical as to destroy any protective measures that she has instituted. In conclusion, I wish to emphasize the following points:

1. All the statistics that I have collected indicate that the mortality following sinus operation is as great where there is routine ligation of the jugular as it is where the ligation is reserved for the severe cases.

2. Sinus should always be exposed before ligation of jugular.

3. Ligation and resection of the jugular vein in thrombosis of the lateral sinus is a valuable procedure, but should be used only in those cases where there is undoubted evidence of septicemia or a thrombosis of the vein itself.

4. In cases of mastoiditis, where the temperature is high, the sinus should be exposed.

5. In thrombosis of the lateral sinus, with absence of positive signs of septicemia or thrombosis of the jugular, the thrombus should be removed, and await developments before ligating or resecting the jugular.

6. Thrombosis of the lateral sinus complicating mastoiditis is of comparatively frequent occurrence, and every otologist should be able to treat it scientifically.

7. Thrombosis of the sinus is nature's way of ligating, and all that is necessary in the majority of such cases is to open the sinus and remove the thrombus.

8. I am aware of the fact that the consensus of opinion among otologists is that in thrombosis of the lateral sinus the proper treatment is ligation of the jugular vein. But my own experience and a study of reported cases lead me to believe that this is radical and unnecessary except in selected cases.

CHART No. 1.

No.	Age	Oper'n perform'd on mastoid	Condition of the Sinus	Condition of the Jugular Vein	Acute or Chronic Otitis	Operative procedure on the sinus	Operative procedure on jugular vein	Result	Remarks
1	38	Radical mastoid	Thrombosed	Collapsed	Chronic	Opened, curetted and bled from torcular and bled from jugular end	Ligated	Recovered	
2	9	Radical mastoid	Thrombosed	Thrombosed (?)	Chronic	Opened, curetted and bled from torcular end	None	Recovered	Jugular ligated 2 days after sinus opened
3	8	Radical mastoid	Thrombosed 10 days after mastoid	Not exposed	Chronic	Sinus opened and throm- bus removed	None	Recovered	
4	15	Radical mastoid	Thrombosed	Not exposed	Chronic	Opened, curetted and bled from both ends	None	Recovered	
5	12	Radical mastoid	Thrombosed 2 days after mastoid	Collapsed	Chronic	2 days later opened after ligation of jugular	Ligated	Recovered	Operation on sinus was 15 days after mastoid
6	13	Simple mastoid	Not exposed at operation	Not exposed	Acute	Opened, curetted, no bleed- ing from ends	None	Recovered	
7	17	Radical mastoid	Thrombosed	Collapsed	Chronic	Opened, curetted and bled from torcular end	Ligated	Recovered	Operation on sinus was 10 days after mastoid
8	11	Radical mastoid	Not exposed at operation	Not exposed	Chronic	Sinus opened and throm- bus removed	Jugular ligated first	Recovered	
9	29	Radical mastoid	Thrombosed	Collapsed	Chronic	Opened, curetted and bled from torcular end	Ligated	Recovered	
10	40	Simple mastoid	Thrombosed	Thrombosed	Acute	Thrombus removed after resection of jugular	Resected	Recovered	
11	46	Simple mastoid	Thrombosed	Thrombosed	Acute	Thrombus removed after resection of jugular	Resected	Recovered	
12	11	Simple mastoid	Thrombosed	Not exposed	Acute	Opened and bled from both ends	Not treated	Recovered	
13	12	Oper'n refused	Thrombosed (?)	(?)	Acute	None	None	Recovered	Had all symptoms and positive blood culture from sinus after operation
14	13	Oper'n refused	Thrombosed (?)	(?)	Acute	None	None	Recovered	Blood culture positive from sinus after operation
15	25	Radical mastoid	Thrombosed	Not exposed	Chronic	Thrombus removed and bled from torcular end	Resected	Recovered	Jugular was resected 4 days after sinus op.
16	15	Radical mastoid	Thrombosed	Not exposed	Chronic	Thrombus removed and bled from both ends	None	Recovered	A peritonsillar abscess drained 15 days later
17	28	Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed and bled from both ends	Resected 1 day later	Recovered	
18	25	Radical mastoid	Thrombosed	Not exposed	Chronic	Thrombus removed and bled from both ends	None	Died	
19	35	Simple mastoid	Thrombosed	Not exposed	Acute	Opened, curetted and bled from torcular end	Resected 3 days later	Recovered	
20	12	Radical mastoid	Thrombosed	Fluid blood	Chronic	Thrombus removed	Resected	Recovered	15 days after operation
21	7	Simple mastoid	Thrombosed	Collapsed	Acute	Thrombus removed	Ligated	Died	blood culture positive
22	18	Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed and bled from both ends	Ligated 18 days later	Recovered	Death due to toxemia of scarlet (author)
23	4	Simple mastoid	Not exposed at operation	Not exposed	Acute	11 days later thrombus removed	Not treated	Recovered	
24		Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed and bled from torcular end	Thrombused, jugular resected 9 days later	Died	
25	16	Radical mastoid	Accidentally opened during operation	Fluid blood	Chronic	Thrombus removed 5 days after mastoid operation	Jugular resected	Died	Sinus infected accident- ally during operation
26	30	Simple mastoid	Thrombosed	Fluid blood	Acute	Thrombus removed after ligation of jugular	Ligated	Died	

CHART No. 1—Continued.

No.	Age	Oper'n perform'd on mastoid	Condition of the Sinus	Condition of the Jugular Vein	Acute or Chronic Otitis	Operative procedure on the sinus	Operative procedure on jugular vein	Result	Remarks
27	1	Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed and bled from both ends	Not treated	Recovered	
28	23	Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed and free bleeding from both ends	Not treated	Recovered	
29	33	Simple mastoid	Thrombosed	Fluid blood	Acute	Thrombus removed after ligation of jugular	Ligated	Recovered	
30	15	Radical mastoid	Thrombosed	Fluid blood	Chronic	Thrombus removed after ligation of jugular	Ligated	Recovered	
31	2	Radical mastoid	Abscess of sinus ruptured ext.	Not exposed	Chronic	Thrombus removed after ligation of jugular	Ligated	Recovered	
32	8	Radical mastoid	Abscess in torcular end of sinus	Not exposed	Chronic	Abscess drained	Not treated	Recovered	
33		Simple mastoid	Thrombosed	Collapsed	Chronic	11 days after mastoid thrombus removed	Resected after sinus opened	Recovered	Sinus was not exposed at time of mastoid
34	10	Radical mastoid	Thrombosed	Fluid blood	Chronic	Thrombus removed from torcular end	Resected after sinus opened	Recovered	
35		Simple mastoid	Thrombosed	Thrombosed	Acute	Thrombus removed	Resected sinus freed	Died	
36	10	Simple mastoid	Not exposed until 13 days later	Not exposed	Acute	13 days later a thrombus moved from both ends	Not treated	Recovered	Infection due to Klebsiella
37	12	Simple mastoid	Exposed 4 days after operation	4 days later was collapsed	Acute	4 days later a clot removed	Resected secondary to treatment of sinus	Recovered	Developed metastatic abscess in knee 42 days after op.
38	34	Radical mastoid	Thrombosed	Thrombosed	Chronic	Sinus opened and bled from torcular end	Resected to clavicle	Died	
39	33	Simple mastoid	Exposed and thrombosed 6 days later	Thrombosed	Chronic	Sinus opened	Resected to clavicle	Recovered	
40	8	Radical mastoid	Collapsed	Thrombosed	Chronic	Sinus opened, bled from both ends	Resected to clavicle	Recovered	
41	29	Simple mastoid	Thrombosed	Not exposed	Chronic	Sinus opened	Not treated	Recovered	
42	16	Simple mastoid	Exposed and thrombosed 3 days later	Collapsed	Acute	Thrombus removed from torcular end	Ligated before jugular opened	Recovered	
43	14	Simple mastoid	Exposed and thrombosed 6 days later	Fluid blood	Acute	Thrombus removed from torcular end	Ligated before opening sinus	Recovered	
44	25	Radical mastoid	Thrombosed	Fluid blood	Chronic	Thrombus removed from torcular end	Ligated before opening sinus	Recovered	
45		Simple mastoid	Thrombosed	Fluid blood	Acute	Thrombus removed from torcular end	Jugular resected	Recovered	Infection developed from meninges
46	8	Radical mastoid	Abscess	Fluid blood	Chronic	Thrombus removed from torcular end	Jugular tied	Recovered	
47		Radical mastoid	Exposed and thrombosed 9 days later	Fluid blood	Chronic	Thrombus removed from torcular end	Jugular tied	Recovered	
48	12	Radical mastoid	Pyogenic abscess, Thrombosed	Collapsed	Chronic	Thrombus removed from torcular end	Jugular tied	Recovered	
49		Radical mastoid	Thrombosed	Not exposed	Chronic	Thrombus removed from torcular end	Not treated	Recovered	
50	15	Simple mastoid	Thrombosed	Not exposed	Acute	Thrombus removed from torcular end	Not treated	Recovered	

CHART No. 2.

	Symptoms of sinus thrombosis. Do you expose sinus first or ligate the jugular?	Sinus exposed and thrombosed. Do you treat it or ligate the jugular first?	Sinus treated and no bleeding from bulb. Do you ligate the jugular?	Thrombus removed and free bleeding from bulb. Do you ligate jugular?	Do you treat the terminal end of the sinus?	Do you ever expose the bulb?	When do you excise the vein and when ligate?
1	Expose sinus	Sinus	Yes	No	Yes	Yes	Excise only when vein is diseased
2	Expose sinus	Either one	Yes	Yes	Yes	Yes	Excises except when condition of patient is serious
3	Expose sinus	Treats sinus	Yes	No	Yes	No	Has never excised vein
4	Expose sinus	Treats sinus	Not always	No	Do not persist in curveting	No	Only where there is an infected thrombus
5	Expose sinus	Ties vein	Yes	Yes	Attempts to get free bleeding	Only when necrosis extends to it	Only where infected thrombus
6	Expose sinus	Ties vein	Yes	Yes	Yes	No	No
7	Expose sinus	Ties vein	Yes	Yes	Attempts to get free bleeding	No	Resect when vein is thrombosed
8	Expose sinus	Ties vein	Yes	Yes	No	Rarely	Always resects
9	Expose sinus	Treats sinus	Always ligates vein and saves 75% of cases	Yes	No	No	Resects when vein is thrombosed
10	Expose sinus	Treats sinus	Always ligates	Yes	No	No	Resects when the vein is thrombosed
11	Expose sinus	Treats sinus	Always ligates	No	No	No	Resects when the vein is thrombosed
12	Expose sinus	Treats sinus	Yes	No	Attempts to get free bleeding	Only when increased	Excises except when patient is serious
13	Expose sinus	Ties vein	Not always	Yes	Yes	Attempts to wash it out	Do not treat vein
14	Expose sinus	Treats sinus	Yes	No	No	No	
15	Expose sinus	Ties vein	No	Yes	Yes	No	
16	Expose sinus	Ties vein	Yes	Yes	Yes	No	
17	Expose sinus	Treats sinus	Yes	Depends on symptoms	No	Yes	
18	Expose sinus	Treats sinus	Yes	Depends on symptoms	Does not curette	Yes	
19	Expose sinus	Treats sinus	Yes	Yes	No	Yes	

BIBLIOGRAPHY.

- Adams, J. L.: Thrombosis of the Lateral Sinus and Internal Jugular Vein Following Suppurative Mastoiditis, Caused by Acute Purulent Otitis Media; Operation; Recovery. (*Am. J. Surg.*, 1908, v. 22, p. 214-17.)
- Barnes, J. H.: Lateral Sinus Thrombosis. (*South, M. J.*, 1916, v. 9, p. 363-66.)
- Black, W. D.: Suggestions in Diagnosis and Treatment of Thrombosis of the Lateral Sinus. (*Med. Fortnightly*, 1914, v. 45, p. 101-04.)
- Boot, G. W.: Cases of Lateral Sinus Thrombosis. (*Ann. Otol., Rhinol. and Laryngol.*, 1915, v. 24, p. 554-60.)
- Bousfield, L.: A Case of Thrombosis of the Lateral Sinuses. (*J. Roy. Army Med. Corps*, 1909, v. 13, p. 428.)
- Bryant, W. S.: Thrombosis of the Sigmoid and Lateral Sinus. (*Ann. Otol., Rhinol. and Laryng.*, 1909, v. 18, p. 912.)
- Canfield, R. B.: A Case of Suppurative Otitis Media with Complete Thrombosis of the Lateral Sinus Superior Petrosal Sinus and the Jugular Bulb with Invasion of the Labyrinth. (*J. Mich. State M. Soc.*, 1917, v. 16, p. 24-25.)
- Cottle, G. F.: Lateral Sinus Thrombosis; Report of Case. (*U. S. Naval M. Bull.*, 1914, v. 18, p. 287-290.)
- Crockett, E. A.: Thrombosis of the Lateral Sinus; When to Operate; What Type of Operation to Choose. (*Ann. Otol., Rhinol. and Laryng.*, 1910, v. 19, p. 356-66. Discussion, p. 437-52.)
- Downey, J. W., Jr.: Symptoms of Thrombosis of the Lateral Sinus; Report of a Case in Which an Exacerbation of Visceral Leses Simulated the Symptoms of Lateral Sinus Thrombosis. (*Ann. Otol., Rhinol. and Laryng.*, 1912, v. 21, p. 1044-50.)
- Foster, J. H.: Mastoiditis with Lateral Sinus Thrombosis and Cerebellar Abscess; Operation; Recovery. (*South, M. J.*, 1916, v. 9, p. 366-71.)
- French, J. G.: Lateral Sinus Thrombosis; Followed by Pyaemic Abscesses in the Prostate. (*J. Laryngology*, 1911, v. 26, p. 520-23.)
- Friedenwald, H.: A Report of Five Cases of Thrombosis of the Lateral Sinus with Recovery, Bearing Upon the Diagnosis and Prognosis of This Affection. (*Tr. Am. Laryng., Rhin. and Otol. Soc.*, 1908, p. 292-362, also *Laryngoscope*, 1909, v. 19, p. 13-32.)
- Friedenwald, H.: On the Efforts of Nature to Cure Septic Thrombosis of the Lateral Sinus. (*Tr. A., Laryngol., Rhin. and Otol. Soc.*, 1913, v. 19, p. 176-84, also *Ann. Otol., Rhinol. and Laryngol.*, 1913, v. 23, p. 1090-98.)
- Friedenwald, H. and Downey, J. W.: Decompression for the Relief of Choked Disc Following Thrombosis of the Lateral Sinus. (*Tr. Am. Otol. Soc.*, 1915, v. 13, pt. 3, p. 503-10; also *Ann. Otol., Rhin. and Laryng.*, 1915, v. 24, p. 613-620.)
- Gogarty, O. St. J.: A Case of Thrombosis of the Lateral Sinus, with Resection of the Jugular Vein. (*Tr. Roy. Acad. M., Ireland*, 1910, v. 28, p. 169-76.)
- Goldsmith, P. G.: Case of Thrombosis of the Lateral Sinus; Resection of Internal Jugular, Spontaneous Evacuation of Abscess of Posterior Fossa, Through the Forearm Jugulars; Recovery. (*J. Laryngol.*, 1912, v. 27, p. 241-43.)

- Hammond, P.: Thrombosis of the Lateral Sinus. (Bost. M. and S. J., 1918, v. 159, p. 405-09.)
- Harrison, E.: Two Cases of Lateral Sinus Thrombosis. (Brit. M. J., 1908, pt. 1, p. 1563.)
- Harvie, J.: Lateral Sinus Thrombosis. (Brit. M. J., 1908, pt. 2, p. 501.)
- Iglauer, S.: Thrombosis of the Lateral Sinus, with Extension into the Jugular Vein and Other Complications. (Lancet-Clinic, 1915, v. 114, p. 107-09.)
- Jones, H. E.: Some Considerations Which Determine the Extent of an Operation on Septic Invasion of the Lateral Sinus. (Sug. Gyn. and Obst., 1914, v. 19, p. 747-52.)
- Kaufman, A. S.: Lateral Sinus Thrombosis with Report of 5 Cases Occurring Without Symptoms. (N. York M. J., 1917, v. 106, p. 1216.)
- Kerr, C. D.: A Case of Lateral Sinus Thrombosis Followed by Hernia of the Cerebellum; Recovery. (St. Barth. Hosp. Rep., 1913, v. 48, p. 161-66.)
- Lewis, A. L.: Thrombosis of the Lateral Sinus with Report of Case of Spontaneous Rupture. (South M. J., 1917, v. 10, p. 72-74.)
- Lynah, H. L.: Primary Lateral Sinus Thrombosis; Without Involvement of the Mastoid Process of Tympanum. (Ann. Otol., Rhin. and Laryng., 1912, v. 21, p. 784-86; Discussion, p. 814-16.)
- Mackie, J., and Tause, H. B.: A Case of Lateral Sinus Thrombosis with Pyaemic Pulmonary and Pericardial Complications, Etc. (Lancet, 1908, pt. 2, p. 1746.) Operation; Recovery.
- MacLay, N.: Septic Lateral Sinus Thrombosis; Operation; Recovery. (J. Laryngol., 1917, v. 32, p. 254-55.)
- McClellan, W. E.: Lateral Sinus Thrombosis. (Yale M. J., 1911-12, v. 18, p. 170-85.)
- McCullagh, S.: Report of Two Cases of Lateral Sinus Thrombosis Treated Post-operatively with Hiss Extract of Leucocytes. (Ann. Otol., Rhin. and Laryngol., 1910, v. 19, p. 387-93; Discussion, p. 432-69.)
- McKenzie, D.: Lateral Sinus Thrombosis; Serous Meningitis; Recovery. (Proc. Roy. Soc. Med., 1912-13, v. 6, Otol. Sect., p. 1-4.)
- Lateral Sinus Thrombosis Followed by Tuberculous Abscess of the Gluteal Region Simulating Pyaemic Abscess. (J. Laryngol., Rhin. and Otol., 1916, v. 31, p. 38-43.)
- McKermon, J. F.: Thrombosis of the Lateral Sinus Cured Without Operation. (Ann. Otol., Rhin. and Laryng., 1914, v. 23, p. 469-71.)
- Millison, W. M.: Lateral Sinus Thrombosis; Clinical Lectures. (Guys Hosp. Gaz., 1911, v. 25, p. 321-25.)
- Morton, J. P.: Lateral Sinus Thrombosis and Cerebellar Abscess. (Dominion Med. Month., 1908, v. 31, p. 376-79.)
- Muecke, F. F.: Case of Lateral Sinus Thrombosis, with Pyemia. (Proc. Roy. Soc. Med., 1913-14, v. 7, p. 14-16, Otol. Sect.)
- Nourse, W. J. C.: Case of Lateral Sinus Thrombosis Following Acute Otitis Media in a Boy; Operation; Recovery. (Proc. Roy. Soc. M., 1910-11, v. 4, p. 56-58, Otol. Sect.)
- Peabody, J. R.: Diagnosis and Frequency of Thrombosis of the Lateral Sinus (Pediat., 1915, v. 27, p. 469-75.)

Quinlan, F. J.: Lateral Sinus and Jugular Thrombosis with Removal of Entire Jugular. (*Ann. Otol., Rhin. and Laryng.*, 1910, v. 19, p. 257-61.)

Rowland, R. P.: Lateral Sinus Thrombosis and Cerebral Abscess. (*Med. Press and Circ.*, 1909, n. S., v. 87, p. 14.)

Roy, D.: Case of Bilateral Inflammation of the External Auditory Canal Followed by Bilateral Sinus Thrombosis; Autopsy. (*Tr. Am. Laryng., Rhin. and Otol. Soc.*, 1912, v. 18, p. 268-74.)

Scott, S.: Lateral Sinus Thrombosis (Streptococcal) with Early Pulmonary Metastasis; Recovery. (*Proc. Roy. Soc. Med.*, 1910-11, v. 4, p. 30-34.)

Simpson, J. R.: Thrombosis of Lateral Sinus with Report of Four Cases. (*Penn. M. J.*, 1914-15, v. 18, p. 457-59.)

Stockdale, E. M.: Serous Otitic Meningitis, with Septic Thrombosis of the Left Lateral Sinus and Internal Jugular Vein Successfully Treated by Operation. (*J. Laryngol.*, 1913, v. 28, p. 1-6.)

Thompson, J. J.: Report of a Case of Lateral Sinus and Jugular Thrombosis, with Abscess Development in the Neck; Recovery. (*Laryngoscope*, 1907, v. 17, p. 291-93.)

Tod, H.: Lateral Sinus Thrombosis; Subsequent Meningitis (Meningitis Serosa); Recovery. (*Proc. Roy. Soc. Med.*, 1907-08, v. 1, p. 30-32, *Otol. Sect.*)

Turner, P.: Thrombosis of the Lateral Sinus with Extension of the Thrombosis to the Facial Veins. (*Polyclin. Lond.*, 1913, v. 17, p. 15.)

Walters, J. W.: The Diagnosis and Treatment of Septic Lateral Sinus Thrombosis, with Special Reference to the Post-operative Treatment. (*Charlotte M. J.*, 1913, v. 17, p. 371-73.)

Welty, C. F.: Thrombosis of the Lateral Sinus with Reports of Five Cases. (*Calif. State J. M.*, 1913, v. 11, p. 464-67.)

Whale, H. L.: A Case of Lateral Sinus Thrombosis; Operation; Recovery. (*J. Laryng., Rhin. and Otol.*, 1916, v. 31, p. 35-36.)

Whitehead, A. L.: A Case of Thrombosis of the Right Lateral Sinus, in Which the Clot Extended Beyond the Torcular Herophilli into the Lateral Sinus of the Opposite. (*J. Laryngol.*, 1909, v. 24, p. 36-38.) Operation; Recovery.

Wood, J. W.: Report of a Case of Thrombosis of the Lateral Sinus. Thrombosis, Exhibiting Symptoms of Cerebellar Abscess; Operation; Recovery. (*J. Laryngol.*, 1911, v. 26, p. 253-57.)

Wood, J. W.: Three Cases of Thrombosis of the Lateral Sinus. (*Lancet*, 1910, pt. 2, p. 1210-12.)

Zaun, G. F.: An Unusual Case of Lateral Sinus Thrombosis. (*Wisconsin M. J.*, 1915, v. 14, p. 282-84.)

Holinger, J.: On Diagnosis and Operation of Sinus. Thrombosis. (*Annals of Otolaryngology, Rhinology and Laryngology*, Dec., 1916)

Barnhill and Wales: *Modern Otology*.

Kerrison, Philip: *Diseases of the Ear*.

Kopetzky: *Surgery of the Ear*.

ABSTRACTS FROM CURRENT LITERATURE.

I.—EAR.

Otosclerosis.

PELTESOHN, FELIX.

Berl. klin. Wchnschr., 1918—LV—252.

In a very interesting and full review of the subject of otosclerosis, the author is unfortunately unable to bring anything new in the way of etiology or treatment. He makes a very good attempt to fix a clinical picture of a case instead of a hard and fast diagnosis by tuning fork tests. The following symptoms, in the order of their importance, are mentioned: Tinnitus of a high pitched character, approximating in sound the C4 fork. Other sounds are complained of, but the high sounds are the most typical. The sounds are apt to be modified by the noises of the day and are at their worst during the stillness of the night. Mental and physical exercise increases the subjective noises. In the early part of the disease the patient often complains of sudden sharp pains deep in the ear. This is especially noticeable in cold weather and is modified in warm weather. Hyperesthesia acustica is a common symptom. Bing's observation that otosclerotic patients seldom perspire seems to have little foundation. The fact that most of these unfortunates have cold feet seems to be well established. They often complain of migraine. The external canal is usually dry and without cerumen. Froeschel's tickling symptom, which seems to be well established, is due to a degeneration of the branches of the trigeminus that supply the external canal.

The loss of hearing varies in its method of onset and the rapidity of the process. After years of apparent quiescence, after severe bodily or mental exertion, the whole process may flame up and become rapidly worse. Excesses in alcohol, acute sickness, lues and many other acute infections may start things for the worse. Pregnancy and the menopause are dangerous periods. In cases where there is a complete fixation of the

stapes, music can be distinctly heard long after the power of understanding speech is lost. Paracusis Willisii is a prominent symptom. It is very difficult for these people to carry on a conversation where there are extraneous noises. This is especially apparent where several people are talking together. In regard to treatment, very little is offered. It is pretty well established that all the older methods of giving phosphorus, potassium iodid, etc., are worthless, and no help is to be looked for in the surgical procedures recommended by the English otologists. The main stress should be laid on hygienic measures and the correction of any conditions of the upper air passages that might lead to irritation of the tubes.

Horn.

The Healing of Drum Perforations.

WASSERMANN.

Berl. klin. Wchnschr., 1918—LV.

The writer cauterizes the edges of the perforation with trichloroacetic acid once or twice a week, followed by a cotton pledget saturated with 10 per cent zinc oil. He has achieved splendid results.

Horn.

Acute Otitis Media Purulenta and Acute Mastoiditis at the Base Hospital, Camp Stuart, Virginia.

KELLY, JOSEPH D.

Med. Rec., N. Y., 1919—XCVI—408.

The writer presents the following conclusions:

1. It is very difficult to obtain a pure culture or to know the inciting organisms in acute purulent otitis media.
2. Mixed cultures will invariably be present after twenty-four hours of discharge.
3. The presence in a discharge of virulent pyogenic organisms does not necessarily mean that mastoid involvement will follow.
4. The individual anatomic characteristics of the mastoid may not be a deciding factor in the development of mastoiditis.
5. Acute purulent otitis media should never be syringed with the hope of irrigating the middle ear. Free drainage

with or without wicks is the treatment to follow, keeping the canal free from obstruction. A piece of absorbent cotton may be placed in the auricle to absorb the secretion and this covered with a handkerchief or bandage.

6. The X-ray in acute mastoiditis is not to be depended upon for diagnosis.

7. An acute purulent otitis media lasting over three weeks and discharging freely at that time invariably means mastoid involvement and should receive operative treatment in order to preserve hearing and protect against the condition becoming chronic.

8. A complete exenteration of all possibly affected cells should be done at the time of the operation.

Emil Mayer.

The Significance of the Form of the Face, More Especially the Height of the Palate, as Regards the Origin of Chronic Otitis.

NORDLUND, H.

Acta Oto-Laryngologica, 1919—I—487.

From a study of 500 persons, 250 having chronic otitis and 250 free from the disease, Nordlund's conclusions are about as follows:

Leptoprosopia is a term signifying a relatively long, narrow face. A high and narrow palate, hypsistaphylia, is a thoroughly characteristic expression of the leptoprosopic type. To an extremely high degree adenoid growths occur in company with a high and narrow palate. The palatal index of height to breadth in persons free from disease of ear or nose was 42.56; the same index in cases of adenoid growths is 51.08. About 72 per cent of the latter had "symptoms of or predisposition for diseases of the ear." The palatal index of height to breadth in persons sound of ear was 42.56, while in the cases of chronic otitis it was 51.52. The cause of this preponderance of otitis in individuals possessing high palates is owing not only to the intermediary adenoid growths but also to the high, narrow epipharyngeal sac where the palatal curtain has a more vertical course and the levator veli palatine has a far less energetic influence on the opening of the tubal orifices.

A. Miller.

On the Hearing Sphere.

HENSCHEN, S. E.

Acta Oto-Laryngologica, 1919—I—423.

The paper comprises 162 pages. In the author's summary he states: From this analysis it may be allowed to conclude that every psychic function presumes some primary local psychic processes in the sensory centers. The primary sensory impressions will be transformed and transmitted to higher psychic surfaces, where the sensory representations are formed, after which they are associated with representations from other senses.

In this theory the presence of different centers of different value or presumed, one higher than the other, of different structure and localization.

In the temporal lobe there may be found a primary receiving center, a secondary word-clang center, a word-comprehending center, and coordinated with these, musical and common sounds centers. Above those centers we have the great association centers, probably in the front brain.

A. Miller.

Two Cases of Skull Fracture With Secondary Mastoiditis and Meningitis, and in One Case Brain Abscess.

SMITH, J. MORRISSET.

J. Am. M. Ass., Chicago, 1919—LXXII—995.

Case 1.—A man, aged forty-three years, white, cab driver, with negative family and past history, fell from the seat of a hansom cab October 31, 1917, and was picked up unconscious bleeding from both ears.

November 2, Dr. Sharpe performed a left subtemporal decompression. The usual incision was made and the temporal muscle incised and retracted. The periosteum was separated, revealing a small bluish black area through the lower portion of the bone. The bone was rongeuired, exposing the dura under very marked pressure. The dura was incised; a clot appeared through the opening, and bloody cerebrospinal fluid welled out. The clot was subdural; there was no apparent injury to the cortex, excepting that the vessels were markedly

congested. The clot was removed and the wound closed as usual with two drains. The patient left the table in good condition. From the time of admission, except for occasional twitchings about the neck, shoulders and arms, unconsciousness was marked. The patient moved the arms and moved to either side. Operation was decided on because of the prolonged unconsciousness, blood in the cerebrospinal fluid, and changes in the fundus oculi. The temperature was 102°, pulse 94 and respirations 18. The patient regained consciousness at 2:30 p. m. (four hours after the operation).

Sixteen days later the writer examined the patient and found a tender postauricular swelling under the right ear, a profuse discharge from the canal, the neck partially rigid, and Kernig's sign present. The patient was stuporous but could be momentarily aroused. The spinal fluid was cloudy. No bacteria were revealed on culture of fluid. The temperature ranged from 99.5 to 101 degrees. A diagnosis of mastoiditis and meningitis was made and a mastoid operation performed. Exposure of the mastoid cortex revealed a fracture running below the temporal ridge forward to the spine of Henle. The entire mastoid cavity was necrotic and filled with pus. The fracture extended down into the angle between the cerebral and the cerebellar dura. The mastoid cells were thoroughly exenterated, and the usual closure and dressing made. The patient died two days later of meningitis.

Case 2.—A woman, aged forty years, white, with negative family and past history, was injured in an automobile accident October 31, 1917, and bled from the right ear. She was admitted to the Polyclinic Hospital one week later.

Three weeks after admission there was an unquestionable mastoiditis with marked postauricular tenderness, slight edema, profuse discharge from the canal, haziness of the mental condition, a positive Kernig's sign, the neck stiff, and cloudy spinal fluid, with a report of no bacteria.

Instead of performing a complete mastoid operation as in the first case, the cortex was exposed and there was a fracture running forward to the spine of Henle, just under the temporal ridge.

The patient immediately began to improve and steadily gained, both physically and mentally, until she was finally

taken home about two months later with the mastoid completely healed.

She showed continuous improvement until February 18, 1918, while in the neurologic clinic, when she developed epileptic seizures beginning in the face, right arm and leg, and then general convulsions lasting half a minute. She was admitted to the ward for observation. There were no seizures in three days, and she again went home.

March 8th, she was again admitted, showing right facial paralysis with impaired sensation; motor and sensory aphasia; weakness with increased reflexes in the right arm; headache, and tenderness over the left frontoparietal region. The pulse and temperature were normal. The patient was weak and lethargic. Consciousness was not impaired.

March 18, Dr. Sharpe performed a left subtemporal decompression and drainage. The usual incision was made. The dura was thick and not transparent, the fluid was not under tension, and very little cerebrospinal fluid exuded. The dura was adherent to the cortex, which was grayish and showed signs of previous meningitis. The cortex did not pulsate.

The left frontoparietal region was explored with a hollow needle. A large abscess cavity was found about 4 cm. from the surface of the cortex. A large amount of thick grayish pus was evacuated, which showed pure culture of streptococcus. The usual closure was made with drainage. The patient finally died of meningitis three weeks later.

Emil Mayer.

Traumatic Vestibular Diseases.

MYGIND, S. H.

Acta Oto-Laryngologica, 1919—I—513.

This is a review by the author of his book published in 1917.

The material comprised 142 patients suffering from head injuries other than gunshot wounds. Fifty per cent showed otoscopic evidence varying from hyperemia of the drum (25 per cent) to perforation of the drum or fracture of the tympanic ring. In 52 cases hearing for whispered voice was below normal, but in only 16 was the impairment deemed certainly

traumatic. The characteristic features of traumatic deafness were lowering of the upper limit for musical tones, elevation of the lower limit and positive Rinné. Bone conduction was seldom shortened, but on the other hand never prolonged. The traumatic deafness disappeared in nearly all cases while under observation.

Spontaneous horizontal rotatory nystagmus was fairly frequent—26 patients. With Barany's pointing test 44 patients showed deviation, generally in both arms, to the same side. Postrotatory nystagmus was seldom pathologic. Caloric tests were made in some cases (where not contraindicated), and in some of these proved a pathologic condition. Galvanic vestibular reactions were observed in 52 cases, but this varies in normal individuals and has insignificant value.

Experimental giddiness after rotation, galvanization or colonization was remarkably small or absent. Patients with true vestibular symptoms were rarely able to stand on one foot with the eyes closed. Vestibular symptoms were not as a rule very marked during the first days after injury.

The book also includes a chapter on vestibular examination in normal persons. A. Miller.

II.—NOSE.

On Cerebral Abscesses of the Frontal Lobe Originating from the Frontal Sinus, and Other Intranasal Complications Resulting from Inflammatory Processes of the Nasal Accessory Sinuses.

LEEGAARD, F.

Acta Oto-Laryngologica, 1919—I—343.

Eight cases are reported in detail. Four of these were abscesses of the frontal lobe secondary to empyema of the frontal sinus.

The abscess cavity was opened in all four cases, the dura being incised in each instance. Three patients died; one recovered. In generalizing on these four cases, Leegaard emphasizes as symptoms severe headache, slow pulse, vomiting and convulsions. Focal symptoms are generally lacking, and the temperature is not characteristic. As to surgical methods,

he prefers incision of the dura when it shows pathologic changes, and puncture when it does not.

He reports two cases of empyema of the maxillary antrum. Both patients died with symptoms of meningitis. In one case autopsy was refused. In the other postmortem examination showed a pachymeningitis and septicopyemia.

His seventh case was one of chronic sphenoidal sinusitis. Death was due to an abscess at the apex of the left temporal lobe.

His eighth case was one cerebrospinal meningitis, and at autopsy pus was found in all the accessory nasal sinuses.

A. Miller.

Pneumosinus Frontalis Dilatans.

BENJAMINS, C. E.

Acta Oto-Laryngologica, 1919—I—412.

One case is reported. The patient, a man aged thirty-one years, gave a history of a rhinitis which had lasted seven months. For two months he had noted a gradually increasing hard swelling over the right orbit. By intranasal operation he endeavored to open the sinus from below, but no pus was noted at any time. Later an external operation was done. The anterior wall of the sinus, which was bulging and of a bluish aspect, was removed. The mucosal lining was not bulged and the sinus contained no pus or fluid, but its communication with the nose was obstructed by a polyp.

The author abstracts four other cases from the literature. The condition is to be differentiated from pneumatocele.

A. Miller.

A New Biologic Treatment for Ozena.

WITTMACK, PROF. K.

Deutsche med. Wchnschr., Berl. and Leipzig, 1919—XLV—70.

The author has originated an entirely new and very interesting treatment for advanced cases of ozena, by transplanting the duct of the parotid gland into the interior of the antrum and allowing the secretion to drain into the nose. He

believes that there is a change in the mucous membrane of the nose in the postembryonal development period which makes it impossible to carry on the functions of the nose.

By transplanting the duct of Steno into the antrum with an appropriate amount of sound mucous membrane surrounding the mouth of the duct, the secretion will be discharged into the nose, and the crusts and odor prevented.

The technic of the operation is simple, the raised up flap containing the mouth of the duct being simply turned into the antrum and the wound closed in the usual way.

His results he considers remarkable. In two weeks the odor is fully gone, although there are recurrences. In about three weeks the crusts are very much less and the patient does without a douche.

He mentions in passing what he declared to be the dark side of the question, a point which is covered in several reviews, in the current number. He has operated in altogether five cases, claiming complete cure in all. All were very young people who had had the usual treatments over periods of years. He does not mention that any of them complained of the great discomfort of the saliva dripping through the nose during eating, a point which all the other men have laid stress upon. He considers it a question for the patient to decide whether the cure is worse than the disease.

Horn.

Paroxysmal Nasal Hydrorrhea Based on Dyspituitarism.

STRAUSS, SPENCER G.

Med. Rec., N. Y., 1919—XCVI—463.

Female, aged thirty-four years, had an adenoidectomy performed when she was fourteen, but otherwise her past history was negative.

The patient presented herself for examination in January, 1919. She stated that two years previously she accidentally struck her forehead on a door. She was stunned for a few moments, but did not lose consciousness. Two months later, without prodrome or warning of any kind, an enormously copious nasal discharge made its appearance. The discharged material was thick, sticky, colorless mucus. It was odorless. It showed a faintly acid reaction to litmus, and at times would

have an excoriating effect upon the skin of the upper lip. No sneezing accompanied this discharge. No temperature elevation took place. There was no local pain or discomfort nor any malaise. A thorough rhinologic examination revealed nothing very unusual. There was no sinus involvement, and except for the slightly reddened and swollen appearance of the mucosa overlying the turbinates nothing was abnormal.

This discharge, which was chiefly from the left nostril, disappeared as suddenly as it began, in six weeks, and the patient found herself as well as before. During the attack she required from ten to sixteen large sized handkerchiefs a day to absorb the discharge. These attacks returned with peculiar regularity each three months and always lasted to within a few days of six weeks.

The patient was obese, weighing 196 pounds, and was sixty-one inches tall. She said she had gained weight constantly but slowly throughout her life, since the onset of her menstruation, which took place at the age of fourteen, shortly after the operation upon her adenoids. Her diet was always moderate and never included sweets, for which she had no desire at all. Further, she never remembered having experienced thirst and consumed very little fluid. These three facts alone immediately point to an unusual pituitary tone.

The recurrent attacks of nasal discharge were not ascribable directly, according to the usually recognized and accepted relationships, to any degree of dyspituitarism; but on the basis of the general constitutional picture which the patient presented, treatment was begun with small amounts of whole pituitary gland preparations and within a few days a favorable effect on the hydrorrhea was apparent. Treatment in this way was continued, and the nasal flood was checked in two weeks. So, cured of her symptoms, she has remained free from further attacks for six months.

Emil Mayer.

Case of Foreign Body in the Nose.

WILSON, BRYED.

J. Am. M. Ass., Chicago, 1919—LXXIII—1441.

A foreign body in the nose of a child is a matter of comparatively common occurrence, but not common in adults who

are sane and of ordinary intelligence; hence this case is of interest.

Mr. A. B., aged thirty-three years, a student of mechanical engineering, first seen on December 28, 1918. During the past three years, breathing on the right side of the nose had been almost completely obstructed. At times he could inhale a little air through that side of the nose, but he could not exhale. He also complained of a very foul discharge dropping back into the throat, which sometimes even produced nausea.

On examination, the nasal septum appeared moderately deflected toward the right. The left nasal chamber showed no particular abnormality, but it was possible to obtain a view of only about the anterior one-third of the right nasal chamber. The application of a little 4 per cent cocain solution brought about enough shrinkage of the membranes to disclose a grayish brown mass of irregularly flat form lying against the septum and occluding inspection farther back; on examination with a probe this proved to be of a hard mineral or stony-like character and extended well back where the probe met definite resistance by what seemed to be a larger mass of like substance. Considerable thick, foul secretion was present in this side of the nose.

With a pair of Hartmann forceps the writer gently grasped what could be seen of this mass, and two small pieces were removed. This was followed by quite free bleeding, which subsided shortly, and the patient was directed to return two days later, at which time the two larger pieces were removed with some small fragments. The large and more flat piece was removed anteriorly, but the irregularly shaped spherical piece had to be pushed backward and expectorated by the patient; rather free hemorrhage followed, which subsided shortly. The nasal chamber was irrigated and sprayed with an iodized oil and the patient directed to return the following day, when further examination of the nose did not reveal the presence of any more foreign substance. The nose was treated by mildly antiseptic oil sprays daily for about ten days, at the end of which time the foul smelling discharge had ceased and the patient was breathing freely through both sides of the nose. The large spherical specimen was found to contain in its center a cherry pit, which, it is quite evident, became

lodged in the posterior part of the nasal chamber, and gradually the mineral-like substance became deposited around it. But the patient was at a loss to explain how the cherry pit became lodged there. The only explanation seemed to be that he had sneezed or coughed at some time when eating cherries and the pit had then been forced up through the nasopharynx and into the posterior part of the nasal chamber. No evidence of sinus infection was found.

Emil Mayer.

The Symptomatology and Etiology of Otosclerosis.

FROESCHELS, E.

Wiener klin. Wchnschr., 1918—XXI.

The writer still uses the lack of tickling reflex as a valuable diagnostic sign. He considers that the brain or an inner secretion of the epithelial bodies may play a causal role.

Horn.

The Active Immunization in Hay Fever.

ESKUCHEN, R.

Deutsche med. Wchnschr., 1919—XLV—182.

The author recommends active use of pollens in even the worst cases. Many of his cases, although not cured, were greatly helped. He uses large doses of calcium chlorid in addition to the injections.

Horn.

The Operative Narrowing of the Interior of the Nose.

SCHONSTADT.

Berl. klin. Wchnschr., 1918—LV—688.

For the purposes of narrowing the whole interior of the nose in the case of ozena and allied conditions, the author incises the gum from one side of the molars to the others, one centimeter above the teeth margins. The soft parts are dissected back as in a facial decortication. The mucous membrane from the floor of the nose and from the septum are now dissected back as far as possible toward the choanæ, mak-

ing two closed pockets under the mucous membrane, which is packed with gauze. Two pieces of bone are now removed from the tibia, three centimeters long, and laid alongside the septum and the soft parts drawn down and sutured. He claims very favorable results in a number of severe ozenas.
Horn.

Hay Fever and Asthma.

SCHEPPEGRELL, WILLIAM.

Med. Rec., N. Y., 1919—XCVI—494.

An analysis of 707 cases of hay fever in the hay fever clinic of the Charity Hospital and in private practice has shown that 37 per cent of the cases developed asthma at some period of the disease. In many of these cases the attacks were light and at long intervals; in others, the asthmatic attacks were so severe and frequent that it formed the predominant feature of the disease.

The treatment of hay fever asthma, during acute exacerbations, does not differ from that in other forms of asthma. The diet and hygienic regulations are also similar. The immunizing treatment, however, in both the prophylactic and curative forms is conducted on the same principles as that of hay fever.

After the diagnostic test has determined the form and degree of the sensitization, 29 units of the indicated pollen extract is injected under the skin of the arm, the site having first been sterilized with iodine. The injections are repeated at intervals of two or three days, the units being increased by 10 to 15 units until the maximum dose is reached, which, in most adults, is 150 to 200 units. This number should be used as long as indicated. The doses for children should be in the usual proportion for their ages.

Marked reactions indicate that the doses should be more gradually increased, or even reduced. These reactions consist of slight hay fever attacks, and occasionally of a more or less general skin eruption resembling miliaria, which may persist for several days.

When the symptoms indicate catarrhal complications, a vac-

cine, preferably autogenous, should be substituted for one to four doses of the pollen extracts.

The results of this form of asthma due to hay fever has given us approximately the same as from the uncomplicated form, viz., 45 per cent seasonal cures, 43 per cent improvements, and 12 per cent without benefit.

When the immunizing treatment has been successful, as indicated by a negative skin reaction, and the asthma persists, this shows that there are other excitants for the paroxysms, and a careful examination should therefore be made to determine the cause.

Emil Mayer.

**Nasal Cauterization in the Treatment of Certain Chronic Affections
(Method of Pierre Bonnier).**

LEPRINCE, A.

Med. Rec., N. Y., 1919—XCV—564.

A slight cauterization of the inferior turbinal or of the septum will cure an enteritis, a nervous disorder, a cardiopathic condition, an asthma, bladder troubles, etc.

Every illness originates primarily in a nervous element, and it is only logical to attack that part of the oblongata which is to some extent the center in which is organized the nervous defense of our principal functions.

Sixteen cases are reported from a large number of similar ones in order to show the diversity of the chronic affections in which nasal cauterization may be applied.

It will be noted that certain patients were improved and others cured by the first cauterization and that in other cases again it was necessary to apply the cautery several times before obtaining any result.

The chief difficulty is to touch the right spot, since the anatomy of the nose and the distribution of the nervous filaments vary in individuals, and, indeed, it may be said that no two noses are alike. However this may be, one may be assured, as a rule, of good results in from 72 to 75 per cent of cases treated.

A source of error to be avoided lies in cauterizing the mucous membrane too deeply. The slightly reddened cautery should be applied lightly so as just to graze the surface suf-

ficiently to provoke a very slight burn, which should no longer be apparent at the end of forty-eight hours.' Severe burns produce no result, while those which are too superficial often affect only the mucosa and do not produce the necessary reflex. This is a matter of dexterity and practice which, however, can easily be acquired.

The employment of cocain is useless and often leads the operator to cauterize too deeply. He uses it only when it is necessary to reduce the size of an enlarged turbinate, when it is a question of cauterizing its posterior extremity, an operation that must be done under control of the sight.

Certain skeptical physicians have refused to see in similar statistics, or in those presented by Bonnier, anything more than fortunate cases or have attributed the cures obtained to suggestion. They are certainly happy suggestions which in eight days can cure an enteritis of fifteen years' standing, hemorrhoids which have existed for twelve years, a neurasthenia of several years' duration, lower blood pressure, etc.

Emil Mayer.

Accessory Nasal Sinuses of Children.

OPPENHEIMER, SEYMOUR.

J. Am. M. Ass., Chicago, 1919—LXXIII—656.

From a careful study of the early anatomic development of the sinuses, it seems probable that many cases of meningitis are the result of unrecognized inflammation of some of the sinuses, as the symptoms of sinusitis are more or less obscure in children. That this should be so can readily be appreciated from the structure of these parts at an early age, for they are surrounded by much softer bone than at a later period of life; there is a more profuse development of the lymphatic and vascular systems, and the mucosa is in most intimate relation with the osseous tissue, so that slight inflammation of the former must produce some pathologic change in the latter. Writer's experience has been that in the child, chronic sinusitis is common, and it will be found on careful examination that many instances of postnasal catarrh in the child are but symptoms of some inflammatory condition of the adjacent sinuses.

The recognition of the various sinus affections in the child is more difficult than in the adult, as the subjective symptoms are not clearly defined. Transillumination is of value, but comparative studies must be made, as the area of light and shadow is rather different than in the adult. The use of carefully made roentgen plates, however, is of great service, especially as regards the presence of pus in the antra or frontal sinuses; and, previous to the tenth year, the use of the roentgen ray is the most valuable diagnostic medium that we possess. The presence of frequent headache should always occasion suspicion of sinus inflammation, and especially when the parts are tender to touch over the sinus involved, bearing in mind, however, that localizing pain with any degree of accuracy is difficult in the very young. In acute sinusitis, pain of an aching character is almost invariably present at some time during the course of the inflammation, but in chronic cases it is very frequently absent, unless the secretions are retained under pressure, when it may become most intense.

A marked symptom of great diagnostic value, when present, is the cessation of pain with the appearance of a free nasal discharge, and the return of the pain when the discharge lessens or temporarily ceases. The presence of a discharge, especially if unilateral and purulent, or semipurulent, in character, is always of diagnostic value, and especially if intermittent. If there is lymphoid tissue in the vault of the pharynx most marked on the side from which the discharge comes, it will often be found that the adenoids are not the sole source of the continued coryza from which the child suffers, but that there is, in addition, a sinusitis. Location of the source of the discharge is of great value in determining which sinus is affected, and the method of ascertaining the source differs in no way from that employed in the case of the adult, which is so well known as to require no further discussion.

In certain fulminating forms of sinusitis in the child, and in persistent suppurative cases resisting endonasal treatment, with marked impairment of the general health or other violently acute symptoms, an external operation will be indicated. The physician must bear in mind, however, that before any radical external operation on the child is undertaken, a most careful examination should be made for any morbid changes

in adjacent areas which may be keeping up the sinusitis by interfering with drainage, as it has been my experience that in not a few instances treatment for a considerable time may be of no benefit until a hypertrophy of the middle turbinated body has been removed, or a lymphoid mass in the nasopharynx, which has acted as a constant source of reinfection. It should be emphasized that any enlargement of the middle turbinated body is a serious obstacle to the cure of inflammatory changes in any sinus, and until it has been relieved the sinusitis will prove most obstinate to treatment.

As a result of these studies it has been my experience that a radical external operation for the relief of purulent sinusitis is rarely indicated and is not productive of as satisfactory results as the more conservative intranasal procedures. Should indications arise, however, demanding such external surgical interference the same type of operative attack applies as in the adult.

Emil Mayer.

Intranasal Operation on the Tear Sac for the Removal of a Sound in a Child Three and One-Half Months Old.

HALLE.

Berl. klin. Wchnschr., 1918—LV—256.

Halle successfully removed a sound which had been lost in the tear duct of an infant three months old. He carried out his regular operation for the intranasal removal of the tear sac and found the sound, which was 23 mm. long, still in the duct. On account of the smallness of the nose the operation was extremely dangerous and difficult. A complete description of the technic of his operation follows.

Horn.

Hyperplastic Ethmoiditis—Diagnosis and Treatment.

MAYBAUM, J. L.

N. Y. State J. M., April, 1919.

The writer presents the following conclusions:

1. Hyperplastic ethmoiditis results from continued irritation of the nasal mucous membrane without infection; when infection occurs suppurative ethmoiditis results.

2. Symptoms are usually characteristic. A thickened membrane on the outer wall of the middle turbinate and the floor of the ethmoid capsule may be the first objective sign of the presence of the condition. Middle turbinate should be re-fracted in such cases.

3. Simple hyperplastic ethmoiditis may throughout its course never show signs of pus formation. Purulent ethmoiditis may never give rise to polypi formation. The presence of pus during the course of hyperplastic ethmoiditis is due to irritation and secondary infection.

4. Opening into the ethmoid is indicated when signs of hyperplastic ethmoiditis exists with subjective symptoms.

5. The Mosher operation is the ideal method of exenterating the ethmoid cells. A thorough knowledge of the anatomic relations and pathologic conditions present are essential.

Emil Mayer.

Discharge of Saliva from the Nose Following Wittmaack's Operation for the Biologic Cure of Ozena.

MUEHSAM, R.

Deutsche med. Wchnschr., Berl. and Leipzig, 1919—XLV—436.

Criticisms of Wittmaack's operation, quoting case where the discharge of saliva from the nose was worse than the original trouble.

Horn.

Treatment of Ozena by Mucous Membrane Flap in the Antrum.

LAUTENSCHLAEGER.

Berl. klin. Wchnschr., 1919—LVI—523.

The author carries out radical antrum operation and fills in space with three flaps—one from nasal mucous membrane, which is turned backward, and covers nasal wall and region of ostium, one large flap from mucous membrane of cheek, which covers floor and extends into nose, and one other cheek flap which he carries into the zygomatic fossa. He does not explain how he closes his incision over the flap.

Horn.

III.—PHARYNX AND MOUTH.

Severe Hemorrhage After Removal of Adenoids.

SEGUI, H.

J. Am. M. Ass., Chicago, 1919—LXXII—1042.

Segui's case teaches the necessity for repose after an operation on the throat. Only the most urgent measures, packing the entire cavity, succeeded in arresting the severe hemorrhage which had already induced a syncopal condition. After the adenoids had been removed, the mother was told to take the boy of twelve home in her automobile and put him to bed, or at least make him lie down. But instead of this the pair went shopping, and the alarming hemorrhage came on the third hour. Segui refers also to a similar tardy hemorrhage in an adult after removal of relics of adenoids. All warn of the necessity for keeping in bed, for twenty-four hours at least, after any operation on the throat. In none of the cases was there any suspicion of hemophilia.

An Experimental Study of a Possible Mechanism for the Excitation of Infections of the Pharynx and Tonsils.

MUDD, STUART AND GRANT, SAMUEL B.

J. Med. Research, Boston, 1919—XL—53.

Common experience and the more sophisticated observations expressed in the majority of laryngologic and pathologic texts are agreed that excessive chilling may be an efficient factor in the excitation of the common "cold"—or, more correctly stated, as the writer hopes to show in a later publication, in the excitation of sporadic pharyngitis, tonsillitis or rhinitis, as distinguished from the epidemic coryza. As to the mechanism of excitation, current opinion has gone curiously astray; reasoning by analogy from the behavior of the viscera of chilled animals, the belief has been widely circulated that the effect of cold upon the body surface is to produce congestion of the upper respiratory mucous membranes. In the paper here abstracted it is shown that the opposite of congestion, namely, ischemia, in the mucous membranes of the palate, faucial tonsils, oropharynx and nasopharynx results from cutaneous chilling.

The method employed was that of direct measurement of mucous membrane temperature variations coincident with chilling of the body surface. Special means were devised for holding the terminals of one thermopile in apposition with the mucous membrane and of another with the skin surface; these thermopiles were connected through a rocking key with a galvanometer, with the aid of whose readings the mucous membrane and skin temperatures could be readily computed. Chilling was effected by unwrapping the subject and turning an electric fan on his bared lower back.

Respiratory rate was kept constant by breathing with a metronome, and depth with the aid of abdominal and thoracic pneumographs. With the chilling employed, no significant change in blood pressure or temperature occurred; such minimal alteration of blood temperature as did accompany chilling indeed was a slight elevation, followed on rewarming by a slight fall. The temperatures of the mucous and skin surfaces, which were open to the air of the cold room, were, therefore, dependent upon the rate at which blood was circulated through them. Local vasoconstriction produced a fall in surface temperature, vasodilation a rise. This thermal method was checked by direct observations of color change with chilling and warming; the results of the two methods were entirely consonant.

Temperature curves obtained as described showed a parallel fall for both mucous membrane and skin, with chilling of a distant area of the body, indicating reflex peripheral vasoconstriction and local ischemia. When the subject was warmed again, the temperatures of the mucous membranes of the palate and pharynx rose, though not to their original level. Tonsillar temperature rose above its original. The skin occupied an intermediate position, reacting about to or a little above its initial temperature.

Inhalation of amyl nitrite, which causes peripheral vasodilatation by a direct relaxing effect upon the smooth muscle of the arterioles, produced a sharp transient rise of skin and mucosa temperatures parallel to the flushing of the face.

Mechanical irritation is apparently also capable of checking momentarily the vasoconstriction during chilling and of causing a slight transient vasodilation.

A pharynx, the site of chronic inflammation of almost two years' standing, and attributed to excessive smoking, showed no fall in temperature with chilling, but a characteristic amyl nitrite response. The reflex arc must therefore have been interrupted in its peripheral motor elements by the inflammation or the factors responsible for the inflammation. A throat with a history of inflammation extending back only a week similarly showed on inspection no blanching with chilling.

The curve of an acutely inflamed soft palate was markedly depressed by inhalation of amyl nitrite. Evidently the vessels were virtually maximally dilated in the inflammation, and the fall in temperature was due to lowered blood pressure and increased respiration.

Scar tissue on the body surface showed reflex vasoconstriction parallel to that of the neighboring skin. The earliest scar tested and thus proved to have vasomotor fibers was at the site of an operation, performed a month before, for removal of a keloid.

In four instances exposure was followed by a "cold" or sore throat. The mucous membranes of one subject remained normal after sixteen exposures.

It seems wiser to defer saying much about interpretation until a later writing. It may be said at once, however, that it does not seem in the least improbable that the ischemia of the mucous membranes resulting from the cutaneous chilling might so disturb the equilibrium between the host and the pathogenic bacteria so often found lurking in the tonsillar crypts and folds of the pharyngeal mucosa as to excite infection.

Stuart Mudd.

A Hospital Epidemic of Streptococcic Sore Throat, With Surgical Complications.

KEEGAN, J. J.

J. Am. M. Ass., May, 1919.

An epidemic of hemolytic streptococcic sore throat has prevailed during February, 1919, at the U. S. Naval Hospital, Chelsea, Mass.

This epidemic infection has been comparable in clinical, pathologic and bacteriologic findings with the epidemics of

streptococcic sore throat reported in Boston, Chicago and Baltimore in 1911 and 1912.

Attention was first called to the presence of an epidemic at the Naval Hospital by the numerous instances of post-operative rise in temperatures in surgical cases, associated with sore throat, and subsequent infection of the primarily clean surgical wounds with a peculiar hemolytic streptococcus.

The symptoms of onset of the sore throat were characteristic of acute bacterial anaphylaxis—sudden chilliness, dizziness, fever, headache, backache, general aching and prostration, with occasionally an initial leukopenia.

The secondary symptoms localized in the tonsils or lateral pharyngeal walls, with complications referable to the submaxillary and deep cervical lymph glands, the nasal sinuses, the middle ear and mastoid, the face, and by metastatic infection to the surgical wounds and the joints. In no case was there a complicating bronchitis or bronchopneumonia. This stage of the disease was constantly associated with a moderate leukocytosis.

The microorganism constantly recovered in almost pure culture from the throat and the infected wounds was a hemolytic streptococcus, growing in large, moist, dropletlike colonies on blood agar mediums.

The hospital epidemic originated in the nose and throat surgical wards, from which it spread by contact to other wards. There was practically no possibility of spread by milk contamination.

Control of the epidemic was effected by suspension of all operating for a period of three weeks, immediate isolation of all acute throat cases, and elimination from the surgical service of all carriers of hemolytic streptococci.

Emil Mayer.

The Formation of Lymphoid Tissue Following the Tonsil Operation.

KLEDSTADT, W.

Munchen. med. Wchnschr., 1919—LXVI—436.

After a complete tonsillectomy he finds lymphoid filling in the fossæ. This springs from the lingual tonsil. To what degree this new tissue assumes the function of the old tonsil he is unable to state.

Horn.

Tamponade of the Tonsillar Fossa, Following the Tonsil Operation.

KOFER, K.

Deutsche med. Wchnschr., 1919—XLV.

The author believes that by retaining tamponades in the fossa for some days following the operation he avoids the danger of secondary hemorrhage and adhesions of the pillars. He also considers that it eliminates the dangers of the post-operative abscesses in the throat and brings about a better and more normal line to the isthmus of the fauces. To those who have met with complications of this sort a reference to the original might be worth while.

Horn.

IV.—LARYNX, TRACHEA AND ESOPHAGUS.

Larynx Involvement in Influenza.

GLAS.

Wiener med. Wchnschr., 1919—XXXII.

During the recent epidemic many severe nasal hemorrhages were seen. In the larynx repeated croupous and pseudo-croupous exudates were observed. Several instances of superficial necrosis of vocal cords are noted. Five cases of perichondritis are mentioned.

Horn.

Sudden Death Following Edema of the Glottis.

STRASSMAN.

Berl. klin. Wchnschr., 1919—LVI—701.

The edema may be due to inflammatory and noninflammatory causes. Among the latter may be mentioned kidney and heart disease, local interference with the blood and lymph supply, urticaria, etc. Angioneurotic conditions may cause fatal edema.

The inflammatory conditions which often appear primary are usually referable to some local condition if careful search is made. Deaths have been reported from primary erysipelas as well as phlegmon of the larynx.

Usually, however, the cause is to be looked for in a trauma,

a chemical or thermal burn, acute catarrh, tuberculosis, syphilis, cancer and many other easily recognizable causes.

These cases may assume a medicolegal aspect, in that the cause of death may be credited to other things. In one case it was possible to demonstrate the laryngeal condition, six weeks after death, where the doctor had sent a patient away from the hospital with a supposed peritonsillar abscess. Several other interesting cases are quoted. Horn.

Treatment of Purulent Perichondritis of the Larynx.

MAYER, O.

Wiener kin. Wchnschr., 1919—XXXII—109.

Out of eleven cases, two recovered without operation. In two cases external incisions were necessary. Five cases needed tracheotomy, one dying of pyemia, and one from secondary hemorrhage from the thyroid artery. In two cases was a laryngofissure necessary. Horn.

Arachidic Bronchitis.

JACKSON, CHEVALIER, AND SPENCER, WILLIAM H.

J. Am. M. Ass., Chicago, 1919—LXXIII—673.

We have selected the term "arachidic bronchitis" to apply to a special form of bronchitis due to the aspiration of peanut kernels into the lower air passages. It doubtless should be applied also to analogous cases caused by the aspiration of a few other organic substances; but up to the present time relatively few cases caused by other substances have been observed; whereas, with peanut kernels the cases have been so numerous and the evidence so overwhelming as to demand a place among the list of diseases affecting the bronchi and lungs of children.

The resemblance of the symptoms to those of laryngo-tracheal diphtheria is sometimes most striking, and in a number of cases antitoxin had been administered, though laryngeal smears and cultures had shown no varying degree of dyspnea and restlessness, which is usually more marked in the younger children. It was noted that the cases of peanut bronchitis show a marked toxemia, which we ascribe to the

absorption of toxins from the difficultly expelled lung secretions. This toxemia resembles that seen in the acute infections, and is at times accompanied by a mild delirium. There is a marked difference between this toxic condition produced by the peanut and the purely aseptic condition which is seen in cases in which there has been a prolonged sojourn in the bronchus of substances of other than vegetable nature.

A dusky cyanosis is often present, but in the bronchoscopic clinic it has often been noticed that in children who have been fighting for air for a rather prolonged period of time, from any cause, this duskiess often is superseded by an intense pallor, the result of the excessive heart strain incident to the strenuous efforts of the muscles of respiration. This pallor frequently causes a false sense of security on the part of the attendant, who is accustomed to associate urgent dyspnea with cyanosis; and tracheotomy has often been performed too late, even though the cardinal signs, retraction of the suprasternal and supraclavicular fossæ and of the lower ribs and epigastrium, have been present the while. Distressing cough is a constant symptom; in the older children it is often paroxysmal and associated with the expectoration of a pinkish gray, thick, tenacious, purulent sputum, which is very difficult to dislodge from the air passages.

We should always remember the possibility of peanut bronchitis when consulted regarding a child who rather suddenly develops irregular fever, restlessness, dyspnea with cyanosis, paroxysmal cough, and the signs of a diffuse, generalized bronchitis, attended with wheezing respiration. A history of choking on a peanut or of eating peanuts at about the time of inception of the illness renders the diagnosis almost certain.

Emil Mayer.

Foreign Body in Bronchus of Left Lower Lobe.

TIEFFENTHAL, G.

Deutsche med. Wchnschr., 1919—XLV—407.

The author removed shoe nail which had already perforated bronchus. Patient died of a bronchiectasis shortly afterwards. [Remarks on earlier attempt would have been better.]

Horn.

V.—MISCELLANEOUS.

The Maxillofacial Surgeon in a Mobile Hospital.

McGEE, REA P.

J. Am. M. Ass., Chicago, 1919—LXXIII—1114.

The wire splint used was made from the ordinary orthodontic wire. Short wires were placed about the necks of selected teeth. These wires were turned with a loop about one-eighth inch in diameter, so that it would act as a ring pulley on each tooth. Two full length wires were used, usually anchored to the upper first molar if present, and if not, to some similarly strong point of vantage. These wires, being doubled, were then worked through the alternate rings on the other teeth, first below, then above; then below; then above. After these wires had been placed, the ends grasped with a hemostat and gentle traction was made outward, which invariably swung the jaw into its correct position, with practically no pain to the patient, and no necessity of manipulation with the hands, no shoving or pushing or pressing to get the fragments disengaged. The wires were then twisted in the median line, so that the jaws were firmly held together.

Fractures of the jaw in war surgery are almost always complicated by wounds of the face. The jaw should first be splinted, or, at least, temporary splint wire should be placed and followed by repair of the facial wound.

Gas gangrene does not occur in the region of the face; consequently debridement is contraindicated.

All live tissues and all bruised tissues that have a sufficient vitality to recover must be preserved, and the rich blood supply of the face makes it possible for many bruised areas to regain their circulation.

The contraction of the muscles of expression draw the lacerated tissues from their normal positions, and the greatest care must be used to make the correct approximation. Actual loss of tissue sufficient to require flap transfer is comparatively rare. The extensive loss of facial tissue from gunshot injury, so often seen in base hospitals, is more frequently

due to shrinkage and adhesions of flesh fragments than to the actual loss from the primary wound.

The routine work was to bring together the mucous membrane before the cutaneous surface was sutured. Tension sutures were used in all extensive injuries to support the approximating sutures and avoid scars and displacement.

When the nose is injured, it should be repaired at once, if possible; and if the injury has resulted in a loss of bone structure, a modeling compound splint should be used to prevent cicatricial displacement.

Patients with the jaw splinted in either the open or the closed position, require liquid diet through a rubber tube attached to the ordinary hospital feeder. Many times the soldiers with their mouths splinted were unable to smoke. This was overcome by placing a glass of water or cup of coffee or cup of chocolate where they could reach it, and by wetting their lips with their fingers they were able to smoke as long as the moisture remained. The process was repeated as often as necessary so long as they wanted to smoke. This gave them a great deal of comfort. It was also possible, in cases in which the lower jaw was fixed or missing, for the patient to hold one nostril closed, and, by moistening the other nostril and putting the cigarette in it, he could smoke very nicely.

The mouth should be cleansed hourly with a warm salt solution. The 5 per cent eusol solution used by the British is very effective in these cases. A compressed air spray is important.

Wounds on the surface of the face should have as little dressing as possible.

Wounds of the tongue were numerous. Bone fragments, teeth and bullets were commonly driven into and sometimes through the tongue. In one case the tongue was more than two-thirds severed in the region of the molar teeth. These injuries are not difficult to repair with proper instruments, and in no case was there failure of union.

Local anesthesia with procain was used frequently. This was a saving of time and was satisfactory.

This work absolutely demands both a surgical and a dental training, combined with as much artistic ability as possible.

Emil Mayer.

Ear, Nose and Throat Complications in Influenza.

HERZOG.

Munchen. med. Wchnschr., 1919—LXVI—552.

In comparison with previous epidemics the complications of ear, nose and throat diseases are rare. There are many cases, however, where the larynx is involved. The trouble usually assumes the form of an acute catarrhal tracheitis, with small white patches on the vocal cords. These may remain innocuous or flare up into a dangerous phlegmonous condition.

Horn.

SOCIETY PROCEEDINGS.

Abstract of the Report of the Scientific Proceedings of the Forty-first Annual Congress of the American Laryngological Association in the Congress of American Physicians and Surgeons, Atlantic City, N. J., June 16th, 17th and 18th, 1919.

BY EMIL MAYER, M. D.,

NEW YORK,

ABSTRACT EDITOR FOR THE ASSOCIATION.

The meeting was opened and the President's address was read by Cornelius G. Coakley, M. D., New York.

The speaker quoted General Munson, in an article presented to the fifteenth annual conference of the Council of Medical Education of the American Medical Association, held in Chicago, March 3, 1919, who gives the procedure employed for the selection of the physicians who volunteered their services in the Medical Corps. He states first the manner of their selection.

After a candidate for the army had been accepted, many of them were found not to be qualified to perform the medical duties assigned to them, so that General Munson states:

"One deduction is that the general reputation of a man is not necessarily a criterion of his actual qualifications. Another, that in their estimates of each other gained by ordinary contact, physicians are not infallible. Another, that a large number of men actually practicing as specialists in this country, and generally accepted as such, are not duly qualified as the experts they are supposed to be. The latter point is one of special interest and concern to those interested in post-graduate and specialist education in this country."

"This experience would seem to carry a moral for medical educators. Have they not a field of usefulness in civil life whereby men who were originally qualified but who later de-

teriorated could have their deficiencies brought home to them and effectively removed?"

With these facts before him, the Surgeon General took steps to remedy the deficiencies by two methods:

First.—By farming out small squads for special instruction in a number of hospitals in the large cities. Many of these hospitals had never before been used for teaching purposes, and since the termination of the war have relapsed into their former policy of not utilizing for teaching purposes the abundant clinical material at hand.

Second.—Schools of instruction for medical officers were established at several camps; these were later combined into one large school at Fort Oglethorpe, at which many of the specialties were taught. The school of otolaryngology was in charge of Major Harris, one of our fellows.

The training given to these medical officers was of an intensive and practical character, and it has been my privilege to talk to many who had taken it at various places, and no single student had anything but praise for the earnestness and enthusiasm of the instructors, and the highest appreciation of the great value of the instruction received. These men will all return to civil life much better medical men as a result of their army instruction.

General Muson states that 70 per cent of the alleged otolaryngologists, after the establishment of the school at Fort Oglethorpe, were rejected. There is a book published purporting to give the names of those who in the United States regard themselves as specialists in diseases of the eye, ear, nose and throat. We find therein approximately 15,000 names; deducting from this number those who devote themselves solely to diseases of the eye or the ear, we have approximately 13,000 specialists in otolaryngology who also treat the eye. If 70 per cent of this number is incompetent, it means that there are in this country about 9,000 so-called otolaryngologists whom the War Department would not consider competent to care for soldiers. They surely are no better fitted to care for the civil population. Until this war there has never been anything before to uncover the deficiencies among otolaryngologists. That there are such deficiencies is known to you all. That they

exist in such numbers is a revelation to me. The principal reason for the incompetency of a large number of otolaryngologists is the insufficient training acquired before the individual buys an office outfit and begins to spray noses, cut out tonsils and wash out ears. At many of the postgraduate schools a six weeks' course of instruction is sufficient for the granting of a certificate, which is beautifully framed and hung up in the office as testimony of the competency of the individual. The best trained men are those who have been fortunate enough to serve as internes for a year or more at one of the hospitals devoted to otolaryngology, of which, unfortunately, there are comparatively few. These internes are usually recent graduates who have previously had an internship in surgery or medicine at a general hospital, quick to learn, enthusiastic and capable. It is probable that less than fifty such internes are graduated each year from the hospitals devoted to otolaryngology. The wealth of clinical material and the opportunity of learning diagnosis and performing operations, both minor and major, under the supervision of the several visiting surgeons, sends their men forth with an initial training that is good and an incentive to continue in this high grade work.

The six weeks' specialist, on the other hand, is usually a much older man, slow to learn, who never gets beyond the rudiments of our professional work. There are, of course, brilliant exceptions to this latter picture.

There are manifestly two problems for us to consider:

First.—How to afford young men desirous of making otolaryngology their life work the best facilities for doing so.

Second.—How to bring up to a higher plane work done by substandard specialists.

It is far easier to plan for the first than for the second group. For the solution of either problem two things are necessary, money and time. The expense of educating an otolaryngologist and the time required to lay the foundation are the main reasons why existing postgraduate schools have not been able to afford the kind of instruction that is desired. Well equipped laboratories, including anatomic material, an abundance of clinical facilities and a quantity of expensive short lived modern instruments, of necessity place the cost of education at

such a figure that if the cost fell solely upon the candidate few students could afford to avail themselves of the instruction. Our present day postgraduate school gives all it can afford for the tuition it charges. Undergraduate schools find it costs more to educate medical students than the income from tuition. Much of the laboratory instruction of the undergraduate school may with but slight added expense be used in teaching graduates. The most economical arrangement is for the graduate school in medicine to be a part of a university and stand in the same relation to the undergraduate school in medicine as the graduate school in philosophy to the college.

The graduate school must be endowed either by individuals or the State. The schools would then be in a position to accept or reject candidates who desired to pursue any special graduate course of instruction by determining in advance whether they are qualified to receive such instruction. They would also be able at any time during the course of instruction to drop registrants for inefficient medical progress. The teaching in such an institution should be supervised by the leaders in the profession, who should have conferences and quizzes with the students and instructors at frequent stated times. The bulk of the actual teaching must be performed by the younger men who have not yet reached that stage in their professional career where their private practice occupies nearly every available minute of their time. The instructors should be adequately paid for their services. Such an association with the university would prove highly attractive to the instructors and result in bringing the best young men to the university centers, where the opportunity for research and study would be greater. If funds were provided by which any one university was able to establish a graduate school in medicine in all the specialties on the lines above indicated, it would not be long before other universities would find it necessary to seek and secure the funds to establish similar schools.

The speaker then outlined the plan of a postgraduate course of instruction in otolaryngology combined with a laboratory and clinical course.

Those who complete such a course would be advised to spend at least one year in the interne staff of a standardized hospital,

university or extramural, devoted to otolaryngology. On the completion of the interne service in a manner satisfactory to the medical board of the hospital and on the presentation to the university authorities of a set of completed histories of all operations performed and the results obtained, the university should grant a degree.

The Prognostic Importance of Tuberculosis of the Larynx.

BY SIR ST. CLAIR THOMSON, M. D.,

LONDON, ENGLAND.

Tuberculosis is one of the most common and deadly scourges of humanity. There is no other which slays so many of our people in the very prime of their career, for it causes one-third of the total mortality during the chief working years of life. It kills 53,000 individuals annually in the small population of England and Wales. It is the greatest cause of disablement in adult life. It leads to more loss to the family and to the nation than any other single disease. It is one of the saddest afflictions.

At the present moment the tuberculosis question is of ever increasing urgency, for a study of statistics would tend to demonstrate that the death rate has not only ceased the steady decline it had been pursuing for many years, but that since the year 1912 it has been steadily rising.

I hold that every case of pulmonary tuberculosis and every suspected case should be examined by a skilled laryngologist, not once only, but at regularly recurring periods; every tuberculosis sanatorium should have a laryngologist on its regular staff; and every laryngologist should embrace any opportunity that may come his way of examining the throat in consumptive patients.

In a few cases tuberculosis can be diagnosed in the larynx before it has sufficiently advanced elsewhere to cause any physical signs. One such patient now under my care has been one of the allied plenipotentiaries in Paris since the beginning of the Peace Congress. Another was under observation, in and out of a sanatorium, for three whole years before my diagnosis of his laryngeal condition was confirmed by signs

in his chest; he still has no bacilli. Another, a medical man, died from tuberculosis in his larynx and pharynx without a pulmonary symptom. These cases are quoted to show the responsibility which the laryngologist may have to bear in the matter of diagnosis and prognosis.

At the King Edward VII Sanatorium at Midhurst, we have a well worked system by which we obtain a report as to each patient's condition once every year after his discharge. Every case is therefore followed all the years of his life, and till his death is recorded. In our island kingdom this task is doubtless easier than on large continents, and so enables us to produce some records which other countries might have no opportunity of securing.

The after-history of 888 patients examined between July, 1911, and June, 1918, is presented in the form of tables—A and B.

They are divided into laryngeal and nonlaryngeal cases and into three groups:

A patient is placed in group 1, if the disease is limited to a small area of one or both apices; these are the slight cases. Group 2 embraces cases more extensive than group 1, but affecting, at most, the whole of one lobe, or severe disease extending at most to the half of one lobe; such cases would still be called of slight severity. Group 3 includes all cases of greater severity than group 2 and all those with considerable cavities; these are the more serious cases.

Looking first at table A, the nonlaryngeal cases, we note that, of course, the percentage of deaths is lowest in the cases of group 1; that it is more than doubled in group 2, and that in group 3 70 per cent are dead within seven years. Of all three groups together, and both sexes, 39.7 per cent have died within this period of observation.

Now, comparing with these results the cases in table B—i. e., those with the larynx involved—what do we find? The first thing which strikes us is that the prognosis as shown by the percentage of deaths is rendered graver in both sexes and in all three groups.

In group 1 the percentage rises from 15.6 to 42.9 per cent. and in group 2 the percentage rises from 38 to 63.3 per cent. In group 3 the increased mortality is not so striking. viz., from

70.4 to 78.3 per cent, and this is what we would expect, viz., that in advanced cases the outlook is so serious that a further addition to it is not noticeable. Taking all three groups together the presence of tuberculosis in the larynx raises the percentage of deaths, during the three to seven year period, from 39.7 to 68.9 per cent.

Put in other words, among all the fairly early cases of pulmonary tuberculosis admitted to a sanatorium, the expectation is that 60 per cent of them will be alive in three to seven years later. But of similar sanatorium patients with the larynx disease only 30 per cent will be alive at the end of that period.

We also note that, just as in nonlaryngeal cases, the percentage of deaths in table B is higher in group 2 than in the early cases of group 1 and still higher in the advanced cases of group 3. But it is very striking to observe that the ratio of the death rate in these three groups to one another is no longer the same as in table A; for in group 2 the deaths are no longer about double those of group 1, but only half as many again; and in group 3 the frequency is only slightly in excess of the figures of table A. Moreover, whereas in the nonlaryngeal cases the death rate of the early cases of group 1 was less than a fourth of the group 3 cases, we see that in the laryngeal cases of group 1 the proportion of deaths has risen to more than a half of those in group 3. This surely shows that, even in a slight and early case of pulmonary tuberculosis—a group 1 case—the detection of a laryngeal lesion renders the prognosis more gloomy than in a case of more advanced pulmonary infection with a free larynx. Put in another way: If a case whose pulmonary condition warrants the patient being classified in group 1, is discovered to have a laryngeal lesion, this would at once grade him down to group 2. It also demonstrates that in cases whose pulmonary condition would place them in group 2, so that only 38.0 per cent would be dead within seven years, the involvement of the larynx lowers their prognosis to nearly that of the group 3 cases, and 63.3 per cent will be dead within the period of observation.

As, at all stages of pulmonary tuberculosis, so much depends on the prognosis, it is sufficient if I have shown the importance of a skilled examination of the larynx. One glance into a laryngeal mirror will often show that

"a man may prophesy
With a near aim of the main chance of things
As yet not come to life."

—Henry IV, Part 2, iii, 1.

much more correctly than he can from all other clinical investigations without it.

This small investigation, after all, is only confirmatory of what we already all know. I submit it with much hesitation, not only because a satirist has said that there are three sorts of lies—lies, damned lies and statistics—but also because I am in the land where the study of statistics is almost a national talent and where the dry bones of figures are made to speak.

DISCUSSION.

THE PRESIDENT: In view of Sir St. Clair Thomson's unprecedented experience in the treatment of laryngeal tuberculosis, I would ask him what treatment is used in the King Edward Sanatorium for it.

DR. COHEN (Philadelphia): May we ask him what are the signs that define the laryngeal infections?

DR. SWAIN (New Haven): Sir St. Clair Thomson evidently can make a diagnosis of laryngeal involvements rather earlier than some of the rest of us here. We would like to have him elaborate to some extent the signs upon which he depends, outside of active ulceration, which we all recognize, for the diagnosis of tuberculosis of the larynx.

SIR ST. CLAIR THOMSON (closing): I have not enlarged on the subject of diagnosis because it is rather a large subject to enter into, and I can only say that the chief thing in diagnosis is the skilled eye of the diagnostician, because it is almost impossible to put down in words the conditions that one sees. It is not only the conditions but the slight changes of these conditions, with progress or temporary improvement. Briefly, pallor is a suggestive thing, whether pallor of the soft palate or of the epiglottis and larynx generally, though, on the other hand, particularly among men and among elderly subjects, congestion may be met with.

Then I hold a great deal in comparing very carefully with one's eye the two sides of the larynx, because if there is a con-

gestion or a catarrh or a thickening, such as a syphilitic infiltration, it is more likely to be more or less evenly disposed on both sides, whereas, where if it is on one side, it is much more suspicious of tubercle. Then I think that the favorite spot to find an early tangible sign, what you call a physical change, is just above the vocal process, hidden to a great extent because it is low down on the laryngeal surface of the arytenoid, just where the arytenoid and the vocal process join one another. One has to see some patients several times to determine that the little hollowness there, the little solution of continuity, or a little crinkling, or a little infiltrated crinkling, is an early deposit. These are, of course, present in the later stages when there is ulceration and perichondritis—the thing is to recognize the early stages. Sometimes, of course, we have a change of voice, but I have records which will be published one day, of a considerable number of people who had no complaint of the larynx, whose voice was not changed, and yet who had distinct tuberculosis.

As to the treatment, the keynote of this is to a great extent masterly inactivity. I am quite opposed to all the violent surgery of the larynx in tuberculosis, from which we suffered chiefly through the work of Heryng of Warsaw and others many years ago.

In the case of these poor people that take years to die, it is impossible to herd them all into sanatoria. The thing is financially impossible. They must be sheltered as well as possible for the remaining years of their life, and in such patients to restore the voice is a very valuable thing.

Rest is the first thing. The first treatment, I think, is the sanitarium, not only because the principles of sanitarium life are so excellent, but because in the sanitarium the patient is not subject to the temptation to talk. Everything is done for him; he presses a button and makes a little sign and everybody knows what he wants, and there are other patients in the same condition, and he is distracted with their little games and walks and amusements, and not like at home, having the family hanging around him and asking him questions and luring him to talk, because vocal rest is the great thing.

I amputate the epiglottis with punch forceps generally if the dysphagia is keeping the patient from rest or dragging him

down. But even there I find the use of the galvanocautery has lessened the frequency of amputation of the epiglottis. I have given up lactic acid; practically all chemical caustics are found to be ineffective compared with the galvanocautery. It is the one treatment, not only for ease but for cure.

Now if the audience doesn't mind a demonstration, I think it might interest some of those who do not know if I tell you that I have brought with me a patient to show, who has been treated on these lines without the galvanocautery, and the patient stands before you. In the year 1902 I discovered that I had tuberculosis and I had a thickening of my right arytenoid and a slight abraded ulcer on the right vocal cord. I had abundant tubercle bacilli in the sputum and some hemoptysis, and I had a little cavity at the top of the right apex. I went into a sanitarium in 1902 for six months, during which six months I never spoke a word and I did another six months of what we call "an after-cure." Then I returned to work in London and for two years (which is the rule) I was very careful. I never smoked, I never went to a theater, began to do a little work and when those two years of trial were over I went full speed ahead and have done more work since then than I ever did in my life before.

Report of a Case of Streptococcus Infection of the Larynx

BY LIEUT.-COL. JOSEPH H. BRYAN, M. D.,

WASHINGTON.

B. V. E., Major, was admitted to the Walter Reed General Hospital, October 8, 1918, with double pneumonia following influenza. He was critically ill, but made a satisfactory recovery as far as his pneumonia was concerned. During his convalescence it was noticed that his voice became very husky and he complained of pain in the region of the larynx, and pain referred to the ears. He was then transferred from the Medical Service to the Ear, Nose and Throat Section. On admission to this section his voice was raucous, and there was some cough and pain in the larynx. Examination showed both tonsils hypertrophied with some exudate from the crypts on pressure; smears showed positive streptococcus. The larynx was

congested, the congestion extending well down into the trachea. There was a marked ulcerative condition noted along the free margin of the epiglottis, the free margin of the right vocal cord, over the processus vocales of the left vocal cord and near the apices of the arytenoid cartilages. The character of these secretions was unique in that the mucous membrane covering the cartilages was not actually broken through, but there was an undermining of the submucous tissue leaving marked depressions with the cup shaped and everted margins. This was especially true along the margins of the epiglottis.

Laboratory findings: Tubercle bacilli after numerous examinations not found. *Streptococcus hemolyticus*, the prevailing organism found in cultures from secretion from the tonsils and middle ear.

The tonsils, which may have been the primary source of the infection, were enucleated, with marked improvement in the patient's general and local condition.

After a month's furlough I saw this officer, and on examination of his larynx found the ulcerations completely healed, simply white cicatricial lines remaining. The abscess in the ear had healed and he had gained about twenty pounds in weight.

DISCUSSION.

DR. THOMAS J. HARRIS, New York: It was my privilege to see two cases at Oglethorpe which were diagnosed as streptococcic laryngitis, the clinical picture of which resembled a little, but not markedly, the description in Col. Bryan's case. These occurred in two officers, both of whom were, as I remember, cases of influenza pneumonia. The picture in these cases was that of diphtheria. They were both streptococcus pneumonia. They both were aphonic, both had some dyspnea, and when the examination, which was made with some difficulty, was accomplished, we found intense engorgement of the mucous membrane of the larynx with a partial pseudomembrane. There were spots of pseudomembrane over the false cords, over the epiglottis and over the aryepiglottidean folds.

DR. HENRY L. SWAIN, New Haven, Conn.: In a couple of cases I happened to see, not in this year's epidemic, with streptococcus throats, there was very marked false membrane

in the larynx, and we have had a number of croup cases this year that were hard to diagnose between diphtheria and the croup, which they really were. I had one case of dry croup, where the whole larynx was dry, the trachea was dry with subglottic swelling requiring intubation. There was at the top of the epiglottis an ulceration similar to that which was found in Dr. Bryan's case. The patient made a beautiful recovery with simple inhalation in the ordinary hospital treatment.

SIR ST. CLAIR THOMSON, London, England: I am afraid I am absolutely ignorant of these streptococcal infections when they are more or less of a subacute character. I have only dealt with the streptococcal infections in a larynx in the form of what we call acute septic laryngitis, which of course is accompanied by extreme prostration and is generally fatal within a few days, sometimes within forty-eight hours; cases in which even with considerable stenosis of the larynx, a tracheotomy does not cure the patient, because he dies of toxemia and heart failure. Such cases are not common. One has to recognize and, of course, to distinguish from the present type of streptococcal infection, so that the streptococcus is not our guide—it is the clinical condition, whether it be the acute toxic cases that I have seen, or these which Dr. Bryan told us about the general condition. In these acute septic conditions, the temperature is sometimes normal, and nothing helps us but our clinical knowledge in recognizing that the patient is a very sick man and that he is going to die, and that is done by the prostration, bluish condition and congestion with a pseudoedema in the larynx and the tendency to cardiac failure. I only mention this to show that there are other forms of streptococcus infection of the larynx, such as those of which I have learned this morning. I see five or six such cases as Dr. Bryan mentions a year. They are all in adults, and sometimes they are in adults of advanced years, and where these have appeared and have been seen by other laryngologists, the diagnosis has nearly always been an early stage of epithelioma. I have several such cases as that. The ulceration lasts from two to three months, does not seem to be benefited by any local treatment that I have tried; in fact, it seems to be made worse, and I have given up local treatment in these cases.

A case that probably was of the same nature as that which Dr. Bryan records was in a distinguished army officer who was invalidated home from France, and whom I saw in the Rockefeller Institute. He had a pulmonary involvement that was diagnosed as bronchiectasis, probably lung abscess, although they were not sure about it, with considerable involvement of both lungs, more on the right, and he had an ulcerated condition on his left vocal cord identical with that which you see here. His symptom most distressing was the cough. Of course, that was partly a lung cough and partly a local cough. His voice was but slightly impaired. We tried local applications, to his distinct distress, so far as increase in cough, and we omitted them. The ulceration healed in about eight weeks. His pulmonary condition was still present when I last saw him, but he is very much better. I have also recorded these as influenza cases, up to this one particular one, which was unquestionably a streptococcus involvement.

DR. JOSEPH H. BRYAN, Washington, D. C. (closing): The question is whether the streptococcus is the cause of the inflammation or whether it is the pneumonia. This particular case started in as an influenza, followed by pneumonia of the streptococcus type. When the patient was able to come to the clinic the tonsils were found to be of positive character, a triple plus, and it was our belief that it was after the influenza affected the patient there was a descending infection producing pneumonia, and also an ascending infection in which the middle ears became involved.

With regard to the temperature, when this patient appeared at the clinic, he was in the stage of convalescence. Although complaining of the ear, there was slight inflammation, not supuration at that particular moment, and there was no temperature, but as the activity of the ear symptoms increased and suppuration set in, there was a slight rise of temperature. In this case we gave no treatment except to excise the tonsils. As soon as that was done and the patient sent off for a month's furlough, there was an immediate recovery, the ulcerations completely closing in, leaving, as I stated in the paper, a mere cicatricial line. All the abrasions at the edges had closed in, so that the parts had practically healed without any local treatment.

Leucoplakia Laryngis.

BY MAJOR NORVAL H. PIERCE, M. D.,

CHICAGO.

The disease as it occurs in these extraordinary regions is rare, and for this reason I have availed myself of the privilege of reporting the two following cases:

G. DeV., male, age 63 years, a composer of music and vocal teacher, a student of Garcia, consulted me because of a hoarseness which appeared whenever he used his voice in vocalization. He was a vigorous, well preserved man, and at the time I first saw him was not at all hoarse. Laryngoscopy showed: A large larynx; the interarytenoid space and vocal processes were normal. In the middle of the left vocal cord was a pearly white patch about a fifth of an inch long. Laterally it extended from the border of the left false vocal cord to the edge of the true vocal cord, over which it projected in a finely serrated manner. The anterior and posterior edges of the patch were square, but had a frayed appearance—that is, delicate pearly white lines alternated with pinkish interspaces. There was no interference with movement of the cord. The rest of the cord was slightly more hyperemic than the right, which might be classed as of the brunette type. Considering the man's age and the laryngeal picture, malignancy was suggested to my mind. However, I advised him to use his voice as little as possible, and requested him to report from time to time for observation. This he did for a period lasting over five years, and no striking change occurred in the appearance of the disease other than this: he informed me that occasionally he coughed up a small piece of membrane. He was never able to save this for me, so that I could not examine it myself, but after such an occurrence the patch was distinctly less white in appearance. We had then here a periodical desquamation of the outer layers of epithelium. He returned, I believe, to England after an unsuccessful struggle in America, and I have not heard from him since.

A. B., male, age 57 years; American; a grain operator; dealt extensively "on the floor"; used tobacco and spirits liberally. Consulted me in consequence of hoarseness. The lar-

ngoscope revealed a pearly gray patch about a quarter of an inch long on the middle of both vocal cords, the edges of which were irregular. The cords themselves were pink and distinctly thickened. The mucosa over the vocal processes was thickened, but there was no visible pitting. The movements of the cords were normal. He was advised to abandon floor trading, and the usual treatment for chronic laryngitis instituted. The inflammatory condition subsided and his voice, though cloudy, lost much of its hoarseness. The patches remained unchanged. During the course of three years he had many relapses. After an unusually severe relapse he returned to me with the information that he at last had come to agree with me regarding the cause of his trouble, and had decided to go to California and give his voice a long rest. The appearance of his larynx at this time was distinctly alarming. The cords were more thickened, the edges more grossly irregular, but the patches were unchanged or only slightly increased in area. He complained of a sense of discomfort in his throat. After some months' stay in California, he returned. He could speak only in hoarse whispers. There was dyspnea on exertion. The laryngoscope disclosed two tissues replacing the vocal cords with coarsely granular surfaces, pinkish white in color, and so large as to leave only a small chink between them in the middle line. The process had been diagnosed malignant from pieces removed. He had been advised to have the growth removed by the direct method. I disagreed with this opinion, my reasoning being thus: If the growth was malignant, nothing short of a total laryngectomy could save him. If it was not, laryngofissure provided a more exact method of removal than direct laryngoscopy. The subsequent history of the case justified my view. The patient was tracheotomized, the larynx was opened, the growth removed, and immediate frozen sections confirmed its nonmalignancy. Radium was placed in direct contact with the cut surfaces within the larynx on several days, after which the larynx was closed. The man has had no recurrence after a year.

While in the first case there was no histologic confirmation, the diagnosis of leucoplakia was sufficiently assured by the laryngoscopic appearance and clinical course of the affection.

The desquamation feature in the cases that occur in regions

other than the outer arytenoid regions is interesting. In the larynx, however, they form a source of irritation during the process of exfoliation and are forcibly projected into the mouth. One can readily imagine that if the case is first seen at the moment when the desquamation is occurring this factor might add to the difficulties of a differential diagnosis. This is true when the process affects the lower margins of the cords.

The change in type which occurred in the second case from pachydermia planus to pachydermia verrucosa was interesting. The change is very simple and consists in the ingrowth of the epithelial elements and an increase of the connective tissue elements may be accounted for by the activating influence of whatever agency causes the original disease.

The method of approach in dealing surgically with such conditions as the second case illustrates may furnish a just ground for difference in opinion. It is my opinion that where extensive disease of the interior of the larynx necessitates removal, laryngofissure is preferable to indirect or direct endolaryngeal methods, because it gives us greater liberty of movement, greater visibility, is more rapid and is quite as safe.

DISCUSSION.

DR. HARMON SMITH, New York: The paper of Dr. Pierce recalls to my mind a patient whom I had under observation a number of years ago. A male, about fifty years of age, had been an inveterate smoker and had gradually become hoarse, the hoarseness extending over a period of several months. His wife was a sufferer from pulmonary tuberculosis and was in a private sanitarium at Saranac Lake. During a visit there my patient consulted a laryngologist who was in attendance upon his wife, and the association of the conditions led this gentleman to suppose that the epitheliomatous looking growth on the vocal cord was tuberculosis. He began heroic treatment by curetting the cord and burning it with lactic acid. There were never any physical signs of tuberculosis of the lungs; he had no temperature and nothing other than the laryngeal condition that would lead one to suspect tuberculosis. During the period of treatment the patient consulted me, and I

expressed the opinion that it was not tuberculosis, but possibly a mucous patch. Dr. Swain has likewise seen this case and is consequently more familiar with the early history and subsequent history than I. However, I understand, from reliable sources, that the patient ultimately died of carcinoma of the larynx. I believe all cases of leucoplakia are the beginning of an epithelioma. In other words, piling up of the epithelium is an epithelioma, and it depends on the progress of this epithelium dipping down and its invasion of underlying structures, which are not its natural environment, for it to become malignant. Malignancy *per se* is only a relative term, and the microscope cannot determine the virulence of malignancy. The picture in the microscope will be the same for the specimen of a carcinoma of the larynx, whether the patient dies in eighteen months or in twelve or fourteen years. So that prognosis based upon microscopic findings is unreliable. Leucoplakia if left alone or treated gently will continue for years without rapid progress or great detriment to the patient, but if curetted or cauterized, will become more readily malignant and, instead of remaining quiescent, will become riotous and rapidly invade the surrounding structures.

DR. HENRY L. SWAIN, New Haven: I remember the case that Dr. Smith has mentioned. I think that was a sheer case of charlatanism and that that man was traumatized, if you will, into his epithelioma that he had subsequently in his larynx. It was a sheer case of overtreatment, carried on through a long period, and I am very glad that Dr. Smith happened to remember the case, because it is very similar in its beginning. I saw it before Dr. Smith had seen it numerous times, and it is exactly similar to Dr. Pierce's second case of a broad, white plaque upon the center of one vocal cord, and subsequently another appeared over the processus vocalis of one of the cords—I cannot remember which. But it was a very interesting case, showing how continue irritation will tend to make epithelial structures degenerate into malignant processes. I suppose, that what Dr. Smith describes, keratosis, like a corn, is really a beginning of epithelioma.

DR. NORVAL H. PIERCE, Chicago: I believe Sir St. Clair Thomson reported a case of so-called desquamative leucoplakia, and the question of leucoplakia of the larynx has been

subject on several occasions to discussion before the Royal Society and would like to hear from him on this subject.

SIR ST. CLAIR THOMSON, London, England: I have watched these leucoplakia for months and sometimes years, and in no inconsiderable number of cases they have eventuated as epithelioma. There is one celebrated case in the annals of this association. I know Dr. Harmon Smith's name is connected with it, and I believe Dr. Gleitzmann, which, if I remember, was a case illustrated in your transactions, with a white appearance as of leucoplakia and that is a historical case, and in that case it was proven to be epithelioma, although it took thirteen years. One case of mine which I left alone, I think was seven years. I have had others of three years, and one of six months, which were common times, but, as usual, America beat the record with a thirteen-year case.

Even if we remove this leucoplakia, the patient should be warned. I have seen cases where very skilled laryngologists have removed the thickening, sometimes examined it by microscope, but unfortunately sometimes omitted to microscope it. The patients, finding a recurrence of their hoarseness two, three and four years afterwards, do not go back to the same man—they come to me, perhaps my cases go to somebody else. But I know more, I think, about malignant disease than I know about leucoplakia, and therefore I am a little biased in simply insisting (though perhaps Dr. Norval Pierce has done it) that the thing at the back of my mind in all cases of leucoplakia, behind the scenes, is probable malignant disease.

DR. D. BRYSON DELAVAN, New York: With regard to this very admirable paper, I have only one thing to say, and that is to call attention to the fact that in the treatment of the case, after the removal of the diseased area, radium was applied. I believe that the postoperative treatment of such conditions (and there are few conditions that are more treacherous than this one of so-called leucoplakia) is going to be a very important thing in the future.

DR. NORVAL H. PIERCE, Chicago (closing): There is very little more to say except that we must also remember, on the other hand, that leucoplakia may accompany tuberculosis, syphilis as also malignant disease.

We may have areas of leucoplakia well defined histologically, leucoplakia in all three of these processes. That is a very important fact to bear in mind in excising portions of tumor for diagnosing purposes. I am quite sure we all agree that as in tuberculosis, masterly inactivity is the proper mode of treatment, so in all these conditions we should do as little as possible, be as gentle as possible in our treatment of the larynx. I do not believe even in excising the pachydermia. I think they get along equally well with very simple, soothing treatment, and we don't run the risk by this method of aiding in the stimulation of these growths into malignancy.

Brain Abscess Dependent Upon Empyema of the Frontal Sinus.

BY LIEUT.-COL. THOMAS J. HARRIS, M. R. C.,

NEW YORK.

W. P., age 26 years, native of Mississippi, was admitted to the eye ward of General Hospital No. 14 on September 10, 1919, suffering from a swelling of the right eye. Family history and past personal history negative. Both lids were found swollen and the conjunctiva congested. Vision 20/50 in each eye. The swelling occupied chiefly the outer third of the orbit. No pain was complained of. The fundus was normal. Examination of the nose showed pus high up on the affected side. Irrigation of the antrum brought away pus. There was a deviation of the septum to the right. A diagnosis of pansinusitis on the right side was made. This was confirmed by X-ray pictures. An intranasal operation for correction of the septum to secure better drainage was advised but refused. The patient gave the impression of being a person of low intellect. He spoke slowly and with a distinct drawl. As a result of local treatment the swelling for a time improved. At the end of a month, however, it had increased to such an extent that the eye was closed. Under threat of court martial the patient finally consented to operation. A radical Killian operation was performed. A large defect was found in the posterior wall of the sinus, together with extensive necrosis in the anterior wall. The dura did not appear to be affected. The wound was only partially closed, and a drainage tube was

introduced. Convalescence was slow. The patient suffered from repeated attacks of vomiting. This was thought to be due to the enormous appetite which he had and the overeating which he practiced. There was at this time no complaint of headache nor any alteration in the pulse or temperature curve. Complete healing had taken place only toward the end of January. It was then noticed that the patient's eyesight had been rapidly failing during the last few days. A test of his vision confirmed this and an examination of the fundus revealed two diopters of neuritis. Careful palpation of the operated field showed a soft, apparently fluctuating mass. The temperature and pulse were normal. There was no paralysis. A diagnosis of brain abscess was made, which was confirmed by the neurologist. After careful consideration, an expectant course of treatment was decided upon. For the next twenty-four hours no change could be marked in his condition except an increase in his apathy. Suddenly, at the end of twenty-four hours, he became almost completely comatose. The pulse had dropped to a little over forty, and the optic neuritis was found to have increased since the last examination to three diopters. Immediate operation was decided upon. This was performed under 1 per cent novocain. An incision was made directly through the integument over the swelling. Retraction of this revealed at once the dura with little or no granulation tissue intervening. Palpation at this time no longer gave any sensation of fluctuation. With the desire to reduce to a minimum the danger of meningitis, extreme care was exercised in the exploration of the frontal lobe. A probe introduced through the dura immediately entered a large cavity without meeting any resistance at all. Bearing in mind the proximity of the ventricles, the probe was not carried beyond 2 centimeters. No brain tissue was encountered and pus in quantity was not evacuated, a few drops only following the incision of the dura. No irrigation whatever was employed. A rubber drainage tube was introduced and held in position by a suture to the outer wound. The wound was left open. An immediate improvement in the condition of the patient took place. His pulse in the course of a few hours returned to normal, and within seventy-two hours he was mentally in the same state as he had been a short time previous to the onset of the active

symptoms. There was at no time any escape of cerebrospinal fluid. A small brain hernia, however, took place which gave some trouble. Amputation of the protruding mass was practiced with benefit. The patient was still in the hospital in February. Later reports are to the effect that while it was necessary to open up the wound for purpose of better drainage, and the patient had proved to be the victim of recurring erysipelas, there had been no return of the brain compression symptoms.

As distinguished from abscess of the temporosphenoidal lobe, abscess of the frontal lobe is virtually symptomless. Unless the disease has extended beyond the silent area, no paralysis takes place. This greatly increases the difficulty of making an early diagnosis. Headache is probably the most characteristic symptom. It is by no means constant nor characteristic in its location. In our patient, headache was never complained of. Several of the case reports contain reference to the apathetic condition of the patient. This was peculiarly true in our case. His appearance, lack of education, locality from which he came, all tended to ascribe this to other causes than a lesion of the brain itself. Projectile vomiting has long been recognized as a symptom of brain abscess. Repeated references are made in the literature to vomiting. As has been stated, our patient was subject to this for weeks before the abscess was recognized, and to this day we are not prepared to say positively that the cause lay in the brain. The latent period can last for an indefinite time. Only when brain compression has taken place or the abscess has extended so far as to cause absorption is it capable of easy recognition. At this time, through the changes in the pulse, as well as in the fundus of the eye, diagnosis is not difficult. Clinically speaking, the cases divide themselves into those of an acute and chronic type. The acute cases are associated with pain and temperature. Usually an empyema of the frontal sinus has been recognized and a radical operation performed without relief to symptoms. Often at the time of the operation, a disease of the posterior wall of the sinuses is discovered. In these cases immediate operation has followed. In others, the brain has been explored only at an interval of several days. The prognosis is grave, but by no means hopeless. A number of cases reported made satisfactory recovery after operation. This depends upon the type

of case, whether one of an acute or chronic nature with a walled off cavity. Meningitis is chiefly to be dreaded.

A valuable suggestion is made by Elsberg, who states that if before an abscess of the brain is opened, packing of gauze soaked in tincture of iodine are placed under the dura all around the wound the danger of meningitis is practically avoided. He further recommends that two drainage tubes be introduced, neither of which should be removed until ready to be taken out, and that they should be shortened from time to time.

DISCUSSION.

DR. WM. B. CHAMBERLIN, Cleveland: I would like to emphasize a point which Dr. Harris made in regard to the lack of symptoms in compression of the frontal lobe. Some three or four years ago, at the meeting of the American Laryngological, Rhinological and Otological Society in Washington, I reported the involvement and practical loss of the entire frontal lobe on the left side. This patient presented absolutely no symptoms of brain involvement, and consulted me on account of a discharging sinus beneath the margin of the left orbit. The probe went so far that I was afraid to introduce it any further. At operation we found practically the whole of the frontal lobe gone, so that the area involved was represented by a plane passing through the external auditory meatus posteriorly, by the midline of the skull, and by the floor of the anterior fossa. This man had no cerebral symptoms before operation or afterwards. At the time of the operation we removed large masses of polypi, which had extended up through the nasofrontal duct. We also removed the entire posterior wall of the frontal sinus as a sequestrum. The cavity persisted as long as I was able to follow the case, some six or eight months, as a smooth walled cavity without granulations.

SIR ST. CLAIR THOMSON, London, England: I think this subject is well ripe for further study. As Dr. Harris has pointed out, I am not aware of any symposium on the subject since Dr. Gerber's collection in 1909. The condition is rare, but, as Dr. Harris says, probably not so rare as you might think. I had one case which has never been recorded, and I am afraid the notes are lost, as it must be twenty years ago, but it had a great point of instruction about it. That, I re-

member, was a woman with pansinusitis, and I forget what I did to her, but I started in to do the so-called radical operation on one frontal sinus. Locally everything appeared to go well, but as has been well described, this woman became apathetic and silly in her manner and I am afraid that as this was the only thing about her, we rather neglected to recognize the seriousness of her condition. Nothing locally was wrong, as I say. She lay in her bed and she was stupid and silly—and we let her die. We made the postmortem examination and found she had an abscess in the frontal lobe on the opposite side, which had not been operated on and which from its appearance must have existed weeks, possibly months.

The lesson is that we must not be in too great a hurry to blame ourselves or our colleagues for cerebral complications in sinus cases unless we get a postmortem.

DR. HENRY L. SWAIN, New Haven: I recall the case of a lady who had the habit of occasionally visiting some of her family who lived in New Haven, and on two different occasions she came to me and I removed some simple polyp growths. On the second occasion, following the removal of one of the polyp growths in the usual manner with the snare, there was a flow of pus which came down from the ethmoid region and I told her I thought she must be aware of that and pay attention to it. She came back to me again for a third visit in New Haven, a year after her second visit, and more pus followed the removal of the growth, and I said: "You have not had this thing attended to." She said: "No, I have not, but I will as soon as I go home." Then her immediate nasal stoppage being relieved by the removal of the growth, she went to visit friends in New York, and while there she had an attack of semiconsciousness and came into the hands of my confreres in New York. I never knew who did the operation, so I have never been able to find out what happened, nor in what hospital it was done. I simply know that in operating upon the ethmoiditis they discovered a large flow of pus from an intracranial complication, and before they could make up their minds it was necessary to interfere further, the patient had another unconscious spell and never came out of it.

I have no doubt now from the history of the case, as well

as I was able to get it together, that she must have had for more than five years, in all human probability, the presence of an abscess in this silent area in her brain, of which she had no other symptoms except occasional headaches.

THE PRESIDENT: At the dinner a couple of weeks ago of the American Medical Association, given to our distinguished guests, it was my good fortune to sit alongside of Dr. Elsberg, and one of the subjects that was brought up in our conversation was the frequency of frontal lobe abscesses associated with sinus disease. Dr. Elsberg said that he had recently had a number of cases, I would not like to state the exact number, but it was either nine or eleven, and his remark to me was that he thought sinus disease developed brain abscesses, and I told him that we see very many sinus cases, but the proportion of brain abscesses following them was very small. It is only the difference in viewpoint.

Here is a man who is dealing in brain surgery to a very great extent, probably more so than anybody in this country, with the possible exception of Cushing, and he is struck with the frequency of frontal lobe abscesses and the association of that with sinus disease. Now, there is one symptom that has been alluded to here which Dr. Tilney, who does a great deal of the cerebral localization, regards as quite suspicious of frontal lobe neoplasm, whether it be a growth or an abscess, and that is the change in disposition. Sir St. Clair Thomson spoke of it, and whenever that is a prominent symptom or noticeable thing in the course of the history of any postintracranial lesion, Dr. Tilney places a great deal of emphasis upon that as evidence of a probable or possible involvement of the frontal lobe. We have not the means of diagnosing accurately frontal lobe abscesses on account of the silent area that we have in other regions of the brain, where brain abscess is consecutive to suppuration, and which is, I think, the main reason why they are overlooked so frequently.

Recurring Calculus of the Tonsil.

BY HENRY L. SWAIN, M. D.,
NEW HAVEN.

A brief report of an interesting instance of recurrence of calculus formation in the same tonsil. Four times masses sim-

ilar in size and shape have been removed from the right tonsil. Dr. Swain found the stones on two occasions and exhibited the specimens, the latest example having been removed in July of last year, the patient at that time being 71 years of age. Her first known performance took place in 1890 or thereabouts; the second in 1904, which was the first time Dr. Swain saw her; the third in 1910, while in a hospital to have some gallstones removed, and the last time, again by Dr. Swain, July, 1918. The first specimen was 1 inch long by 12/16 inch broad at its largest measurements, irregularly ovoid and made up of three separate portions, tightly fitting together, with smooth facets, as in the case of gallstones. The last mass is slightly smaller all round. An attempt to establish a definitely peculiar lining to the pocket in the long, thin, attenuated tonsil mass which lines the tonsil fossa failed because the patient on each occasion failed to report further.

DR. D. BRYSON DELAVAN, New York City: In one of my cases I made every effort in extracting it to remove it with much care, but just as the stone came out the patient sneezed slightly, and the stone disappeared.

The practical suggestion that arises from that accident is that if in operating on these cases the patient be inverted, be placed upon a sofa, with the head hanging backward so that the law of gravitation will not cause the loss of the specimen, it might also offer some protection against accident of one kind or another to the patient.

SIR ST. CLAIR THOMSON, London, England: I have not had a patient, who developed this calculus habit which Dr. Swain refers to, but I am tempted to get up because of a recent case of the misleading that we sometimes get in diagnosis of calculus in the tonsil. It impressed itself upon me, because he was a very valuable man to the British government in the middle of the war, a great authority on high explosives and that sort of thing, and he came to me simply because, being a very shrewd and scientifically trained man, he detected an enlarged gland beneath his right jaw and had some discomfort in swallowing. On examining him, I found the right tonsil looking blue and red and angry and projecting, and at one point there was a little gray slough. The man was 65 years of age.

I did what we all do, I think—use the most valuable instrument in examining anything of that kind in the pharynx, and that is one's forefinger, and to my horror, I felt in this tonsil an infiltration of cartilagelike hardness. I took a bad view of the case, and in order not to break it to this man suddenly and yet to be prepared for anything, I had a consultation next day with a well known surgeon who devotes himself to the surgery of the neck, and he agreed with me that it was suspicious, but he said, "Let us feel it with a probe," and when feeling it with a probe we found a calculus in the middle of it. The calculus was dug out on the spot, and all his alarming symptoms disappeared.

**A Case of Nodular Headache of Nasal (Sphenopalatine-Meckel's)
Ganglionic Origin.**

BY GREENFIELD SLUDER, M. D.,

ST. LOUIS.

Nodular, or rheumatic headache, as it is sometimes called, is not frequent compared to other headaches. It is characterized by the presence of nodules from the size of a pea to that of a hazelnut in some part of the scalp or the nape of the neck which are supposed to be the cause of the headache. Sometimes they are spoken of as being found lower down in the shoulders.

A lady, 40 years old, gives a clear history of a "lower-half headache" of great severity from her childhood, stating that when it was very bad "knots" came in her neck and over her scalp. She has been my patient for fifteen years, but I never succeeded in seeing her when the "knots" were present until one month ago. At this time she had an unusually severe attack of nasal ganglion neuralgia, for which she consulted me. She spoke of the severity of the attack and called attention to some "knots" in her neck. At the lowermost part of the occiput were two nodules, near the middle line, each side, one centimeter wide and two centimeters long, tender to touch. Full cocaineization of the nasal ganglion relieved the pain and an hour later the node of the right had disappeared. That of the left side was present twenty-four hours later, but smaller and less sensitive. It disappeared in ten days more.

I cannot help thinking that these nodes are manifestations on the part of the sympathetic not unrelated to some of the skin lesions of neurotic, sensory or trophic origin. One case, however, must be remembered merely as one case.

Nausea as a Nasal Reflex.

BY GREENFIELD SLUDER, M. D.,

ST. LOUIS.

My interest in this phenomenon began ten years ago, when I injected the nasal (sphenopalatine) Meckel's ganglion with plain 95 per cent alcohol. It was not uncommon then to produce nausea by that injection. I have seen such a case in which the patient was nauseated instantly by the injection, vomit for six days, intermittently. I have seen this phenomenon also follow the postethmoidalsphenoidal operation. Since I added carbolic acid to the alcohol injection, nausea has been much less frequent, but still sometimes follows. Frequently, in the throes of severe pain produced by any cause, nausea and vomiting occur, a fact which has been well known probably throughout all time. Anything which will stop the pain under these conditions will stop the nausea. So it has happened that on many occasions a severe nasal ganglion neuralgia has been accompanied by nausea which ceased with the cessation of the pain by anesthetizing the ganglion. Such cases have been quite frequent in my experience; but within the past year I have had a number where there was not any pain, although the nausea was severe. In one severe nasal neuralgia, on many occasions pain was absent, although a purposeless vomiting had continued for twelve hours, and was stopped in five minutes by the application of one drop of 90 per cent cocain to the nasal ganglion district. This has been repeated many times in this patient.

In another case, one of hyperplastic nonsuppurative sphenoidal headache, marked nausea without headache is sometimes manifest. Application of one drop of 90 per cent cocain solution to the floor of the sphenoidal cell, stops it in about ten minutes. In this cell, the Vidian canal may be felt elevated from the floor about one-half centimeter.

These observations indicate that the power of making nausea reflex from the nasal ganglion or the Vidian trunk is independent of any pain complement. They suggest, however, that in whatever way the reflex is made it is probably not unrelated to that which makes the pain, inasmuch as it is relieved by cocain locally applied, just as the pain reflex is stopped. Overdosing with cocain makes nausea return in these cases.

DISCUSSION.

DR. HARMON SMITH, New York: I have nothing to say concerning the first paper of Dr. Sluder, but would like to cite a case similar to the one mentioned in his second paper which came under my observation three years ago.

A man, about forty years of age, had been under the care of Dr. Gruening of New York City for a number of years, who at periods of about six months had marked nausea with projectile vomiting of such severity that he would have to give up his business for about a week. As a corrective of this condition, Dr. Gruening would cauterize the nasal septum at its apex of deviation, and shortly following this, the patient would recover from his nausea. After Dr. Gruening's death the patient was referred to me by one of the doctor's former associates, with the recommendation that I correct the deviated septum by a submucous resection as a permanent curative measure. I protested against assuring the patient that this operation would be a successful one and performed the resection with this fact impressed upon his mind; to my surprise, however, the patient has now had no recurrence of his nausea for a period of three years since the date of the operation.

I have had a second similar experience since this first case and assured the patient, with reasonable emphasis, that the nausea would be relieved by the submucous resection, and the subsequent facts have borne out this assurance. In both these cases the septum was markedly deviated, creating pressure against the inferior turbinate, and I believe the nausea to have been reflex associated in some manner with the nasal ganglion.

DR. EMIL MAYER, New York: I would like to say that in association with the cases of dysmenorrhea that I have mentioned more than once, and have relieved frequently by intranasal treatment, there is also this question of vomiting, which

I have, however, put into the category, as Dr. Sluder says, of being associated with the pain, but nevertheless, the relief of the nausea is just as permanent and just as quick as the relief of the pain in cases where the relief follows.

Perhaps I might say in this connection that in recent years I have more and more tested these cases of dysmenorrhea by cocainization at the time of the painful menstruation, and to learn whether the patient did get relief from an application of cocaine to the sensitive spots, and in most cases where relief was immediately occasioned, subsequently put trichloroacetic acid on the parts, and I have just before leaving home heard again of two more very successful results following this line of treatment.

DR. GREENFIELD SLUDER, St. Louis (closing:) I am greatly interested in Dr. Smith's report. I can add nothing to it. It is an observation which I think ought to go in with the record of these cases. I can understand how in a greatly irritated state of the nose the reaction may be projected from a point elsewhere than the nasal ganglion, from any part, inasmuch as the sympathetic supply of the nose comes through the ganglion and proceeds to the nasal cavity.

COL. CHARLES W. RICHARDSON, Washington, then presented some of the remarkable results that had been attained under his direction in the hospital at Cape May, in the reconstruction work of soldiers who had become deaf as a result of war injuries.

Three young soldiers were presented who had been taught "lip reading" under the auspices of the government. These young men were totally deaf, and their ability to converse and understand by means of "lip reading" was of extraordinary interest, and was received with great applause. Col. Richardson also presented a number of young women who had been assisting in this department, together with the lady in charge of the service, and these were requested to rise and were greatly applauded.

Col. Richardson then spoke as follows:

"It gives me great pleasure, at the request of the president of the laryngological society, to bring the patients and teachers of the Section of Defects of Hearing and Speech, whom I

utilized for demonstration before the American Otological Society, to a demonstration before the American Laryngological Association.

"I regret exceedingly that I have only the patients who have been treated for defects of hearing. Had I known you might request me to bring my patients before you, I should have had also some of the cases of corrective speech work, which are as remarkable, if not more so, than those of the Section of Defects of Hearing.

"I wish you to take cognizance of my aides, to whom all honor is due for this work. It is only that the director can organize and direct. It is through the instrumentality of his instructors that he obtains the results, and I want to pay tribute to the remarkable efficiency, cooperation and enthusiastic aid furnished me by this band of teachers.

"Our treatment has been through the individual instructive method, intensive in its character, the patients having from one to three or four half-hour periods each day as long as they could accomplish results without fatigue. They have had practice among each other, and with the use of the mirror. In other words, it has been our object to keep these patients in a complete and continuous atmosphere of speech reading, so that the new line of transmission of visual conception of sound waves may be conveyed by the visual track to the auditory center instead of by the old method through sound waves conveyed through the auditory track.

"In order to create and maintain this at its highest degree of perfection it is necessary to have intensive work. These patients whom you see have had only the average period of training in speech reading, about two and a half months, and in them you see as perfect a type of speech reading as it is possible to produce."

A Symposium on *Streptococcus Hemolyticus* Carriers—
Clinical Aspect.

By JOSEPH H. BRYAN, LIEUT.-COL., M. C.,

WASHINGTON.

The rôle the tonsil plays in harboring infectious organisms has long been known, but its importance as a disseminator of

disease has only been recently recognized, or at least appreciated. As a carrier of the diphtheritic bacilli it has been demonstrated that it has a very decided influence on the individual's social and economic value, as far as the public health is concerned. But by its recognition as a carrier of the streptococcus as a secondary invader, its dangerous rôle has been greatly increased. It added only a large assembling of men from all walks of life in the camps all over the country when the new army was being mobilized in 1917, for various acute infectious diseases to develop, especially scarlet fever and measles. It was the latter which more extensively prevailed, and you will all recall how frequently the sequelæ, laryngitis, bronchitis and pneumonia with empyema, followed. The results were so serious as to cause great concern to the medical officers of the army, and alarm as far as the general public was concerned.

The streptococcus that was the greatest factor in producing these serious complications was that known as the hemolyticus, an organism producing a lysis of the red blood corpuscles. The infection is secondary in character, and is ascending or descending; in the former, sinusitis, otitis media and mastoiditis; and in the latter, laryngitis, bronchitis, pneumonia, and frequently empyema resulting.

No doubt, many of these cases entered the army from civil life as carriers. Levy and Alexander (2), in an examination of 489 new recruits from various sections of the country, found 14.8 per cent carriers of the streptococcus hemolyticus. These findings are interesting and very instructive when compared with their further investigation made on troops after six months' service, all being apparently healthy men. Of ninety-five men from one company examined, seventy-nine, or 83.2 per cent, were carriers of streptococcus hemolyticus, 64.3 per cent being heavily infected. The inference is this increase in the disease was acquired in hospital from the original carriers.

It would have been interesting if we could have determined the evidence of streptococcus carriers in all patients immediately on their admission to the hospital, but this was not possible. The probabilities are that many of these cases entering the hospital for other than throat and nose conditions were

carriers, and were only discovered after an indefinite stay.

The isolation of all carriers was strictly carried out, no one from outside was permitted to enter this ward save the medical officers, nurses and corps men assigned to the care of these cases.

Clinically these patients presented the usual variety of throat and nose disorders found in the average clinic. The tonsils were either hypertrophied with follicular degeneration, small and degenerated, or submerged.

We divided the cases into five groups for treatment and observation. Group 1 received no treatment, group 2 received a hot alcohol gargle (20 per cent in water) every four hours during the day, group 3 received a hot Dobell's solution gargle every four hours during the day, group 4 received an application of a 5 per cent solution of dichloramin-T in chlorococaine to the face of the tonsil every four hours daily, group 5 received an application of a 25 per cent solution of nitrate of silver every four hours. These cases were all discharged after two successive negative cultures were obtained on separate days.

That obtained from a 25 per cent solution of silver nitrate gave the best results in that the stay in the ward before two successive negative cultures were obtained was only 8.8 days.

Postoperative findings in a series of twenty cases showed pure streptococcus hemolyticus from the crypts of the excised tonsils in eighteen cases, or 90 per cent; negative in two cases, or 10 per cent. Adenoids were found in three of these cases and were positive in one case, or $33\frac{1}{3}$ per cent, and negative $66\frac{2}{3}$ per cent. Of these twenty cases, six, or 30 per cent, never gave positive culture after operation. The remaining fourteen showed positive culture from the fossæ, and they were treated daily with a local application of a 10 per cent solution of silver nitrate. These throats became negative in 10.7 days after operation.

From the above, it will be seen how futile local treatment is in attempting to eradicate the streptococcus hemolyticus from the tonsils. While it may be possible to sterilize the surface of the tonsil and some of the crypts, there will nevertheless remain a number of these crypts that are inaccessible to any chemical means of disinfection. Granting that all the

crypts were accessible there still remains the possibility of still further disease in the deeper and more inaccessible parts of the gland. It is probable within the experience of all who have enucleated many tonsils to find on sectioning a large or even multiple abscesses which gave no evidence of their presence.

The Bacteriology of Throat Carriers of *Streptococcus Hemolyticus*.

By HENRY J. NICHOLS, Lieut.-Col., M. C.

In hemolytic streptococcus infections, the carrier problem is difficult. No virulence test or differentiation of groups is available, and the number of apparent carriers may be very large. In a recent survey of attendants and patients at the Walter Reed Hospital, Simmons found the weekly carrier rate in March and April to be between 50 and 90 per cent, with no cases of streptococcus pneumonia. By analogy and experience we are forced to believe that some of these organisms found carriers are pathogenic and that others are practically saprophytes, but until we know which, are equally forced to consider them all as potentially dangerous.

The term streptococcus hemolyticus has been recently coined and in itself does not stand for a definite biologic species. It means simply hemolyzing streptococci, of which there are at least two kinds, human and bovine. For clinical purposes, however, it is synonymous with the older term "*streptococcus pyogenes*," which culturally forms a single species.

In a series of ten cases of severe streptococcus infection compared with ten cases of severe pneumococcus infection, at the Walter Reed Hospital, no difference could be seen in the hemoglobin estimations; both series showed a secondary anemia averaging about 70 per cent. Like pigment formation in certain bacteria, the property of hemolysis in streptococci seems to be a metabolic activity that has no clinical equivalent.

The detection of carriers of streptococcus hemolyticus is fairly simple and resolves itself into a question of obtaining suitable material from the patient and of making a suitable examination in the laboratory. The crypts of the tonsils are the most frequent habitat of hemolytic streptococci.

The evidence for his conception is as follows: (1) Cultures from the surfaces of the tonsils are positive more frequently

and more strongly than cultures from any other area of the nasopharynx. (2) Crypt cultures *in vivo* are positive in a higher percentage of cases than surface cultures. (3) Crypt cultures of excised tonsils are positive in a high percentage. (4) Excision of the tonsil is the surest way of curing carriers. Under these circumstances it is evident that cultures of the tonsils are the most reliable source of material. In a series of fifty normal cases examined at the Walter Reed Hospital, 28 per cent were positive with the ordinary throat cultures, while 50 per cent were positive by crypt cultures, an error of 22 per cent in the ordinary examination. A proper tonsil culture can be taken only with due care as to exposure and instruments, and is preferably made with the help of a laryngologist, although a light massage of the tonsil with the end of the swab suffices to bring out crypt contents in most cases.

Streptococci in such material are not very delicate and withstand some drying and change of temperature, but of course should be cultured with reasonable promptness. The standard culture media for the first inoculation is blood agar.

Milk can, of course, spread hemolytic streptococci, but the bovine types are of no clinical significance, and milk is dangerous only if it has been contaminated by human strains. This differentiation may rule out a few cases of bovine strain carriers.

By analogy, with the pneumococci the most promising field is that of differentiation by agglutination. As is well known in the case of the pneumococci, the separation of type has been of great value in diagnosis, prognosis, prevention and treatment by focusing attention on certain groups which are more important than the ordinary pneumococci found in the mouth.

It is to be hoped that bacteriology may also contribute some specific answer to the following questions:

Is the chronic carrier the reservoir of streptococcus infections or is the disease spread chiefly by cases and by acute contact carriers? Is the chronic carrier dangerous to himself or is he immune? So far the answer to these questions must be attempted on epidemiologic evidence, as no reliable test for virulence or immunity is available in the way of skin reactions or serum reactions.

SUMMARY.

1. Satisfactory carrier work in the effort to control the spread of hemolytic streptococcus infections is difficult for the following reasons:

(a) The carriers may be very numerous, including over one-half of the population.

(b) The streptococci found are nearly all identical culturally with each other and with streptococci isolated from streptococcus lesions.

2. The problem will be made easier if progress is made in regard to—

(a) A virulence or specific test to determine the danger of chronic carriers to themselves and others.

(b) Some differentiation of groups which would limit the work to a practical basis.

RECOMMENDATIONS.

The medical officers who have taken part in this symposium have agreed on the following recommendations in regard to the streptococcus hemolytic carrier problem in the army:

1. Our knowledge of hemolytic streptococcus carriers is incomplete, and every effort should be made to answer the following questions:

(a) Are streptococci found in carriers all of equal importance, or are there different groups which differ in clinical significance?

(b) Is the chronic carrier dangerous to himself?

(c) Is the chronic carrier dangerous to others, or is the disease spread chiefly by cases or by case contact carriers?

2. In the absence of knowledge on these points, no final program for handling the problem can be stated, but a tentative program should be adopted, which in case of doubt should err on the safe side.

3. When no streptococcus disease is present and in off seasons.

(a) For soldiers in hospital. Incoming patients with throat infections should be cultured for hemolytic streptococci. Any positive case with diseased tonsils should have a tonsillectomy. Clean and infected measles wards should be maintained for practice in ward technic.

(b) For soldiers in barracks. Clinical and cultural surveys should be made for the detection of chronic streptococcus infections, such as tonsillitis and otitis media, which when discovered should be treated to remove possible foci of future epidemics.

4. In the presence of streptococcus complications and during the streptococcus season.

(a) In the hospital.

1. No carriers among attendants should be allowed in surgical wards or in wards with respiratory diseases.

2. A streptococcus isolation ward should be established to handle special cases.

3. Positive and negative measles pneumonia and nose and throat wards should be maintained with strict technic.

4. All admissions should be isolated until distributed to wards.

5. Throat cultures for hemolytic streptococci should be made on all admissions with respiratory diseases for record.

(b) In barracks.

1. Recruits should be held for observation and cultured. Positive cases should be separated from negative as far as possible.

2. Clinical and cultural surveys should be made to pick out cases of tonsillitis, otitis media, and sore throat, which should be sent to hospital.

V. In the absence of exact knowledge and with due regard to military necessity, no attempt to isolate all streptococcus carriers is advocated at present.

Bacteriology of Streptococcus Hemolyticus.

By MAJOR ALPHONSE R. DOCHEZ, M. D.,

NEW YORK.

The complete biologic classification of any pathogenic micro-organism presents a very complex problem. The first phase of the undertaking concerns itself with the development of reliable methods for the determination of antigenic differences between members of the species and the application of these methods to the discovery of the immunologic relationship between a limited number of strains purposefully selected. In

this way the degree of similarity and diversity of types is shown and also the probable number of types, and the proportion of classifiable to unclassifiable strains. The next step of necessity is the testing of the adequacy and universality of the information so gained by applying the tentative classification to a large number of strains of the organism obtained under what may be described as normal conditions of pathogenicity. That some sort of equilibrium has been established in nature among microorganisms that have produced disease over long periods of time is not unlikely. Indeed, evidence obtained from the study of pneumococci supports this view, although departure from the norm may occur under special conditions. After the relationships of the pathogens of the species to one another have been discovered, it then becomes important for purposes of epidemiologic study to compare by the same methods the pathogenic with the saprophytic varieties. Such a task requires years for its completion, and many difficulties and seemingly unexplainable phenomena are encountered. In the beginning, the broader lines of differentiation must be drawn, and divergent results discarded for the time being, since, if the original conception is correct, most of the discrepancies disappear with the advance of knowledge.

In this paper are presented the facts so far obtained in the present study of *S. hemolyticus*, in accordance with the plan outlined above. The strains were collected in a limited community during the course of what may be considered an epidemic of bronchopneumonia secondary to measles. Individuals, however, from all parts of the United States were passing rapidly through this community, which was a center for primary training of the aviation service, so that a wider range of territory is represented than the immediate community itself. All the strains were investigated as to their cultural reactions, bile solubility, capacity to hemolyze red blood cells and to ferment the different test sugars, and as to the hydrogen ion concentration limiting their growth, and thus identified as accurately as possible with *S. hemolyticus* of the human type.

A technic was then developed for studying the immunologic reactions of agglutination and protection. By the reaction of agglutination four distinct immunologic types and a certain

number of unclassifiable strains have been discovered among the 125 strains studied. Individuals of the same type are closely related to one another immunologically, and the different types can be sharply distinguished one from the other. In addition to the four types, study of the reactions of which has been completed, there are in addition two other types, investigation of which is as yet incomplete. The technic of the agglutination reaction demands great care, both as regards the handling of the organism and the preparation of the medium for their growth. In the medium used by us, a large percentage of strains have grown sufficiently diffusely to permit the preparation of stable suspensions. To what extent continuous growth in this medium has promoted the tendency to diffuseness, and whether the same percentage of freshly isolated strains will grow diffusely, we are as yet unable to say. We have found that by the immunization of sheep, a highly specific agglutinating serum is obtained, but that the serum produced from rabbits is not so specific and may show a wider range of crossing, especially in one of the types of streptococcus described. Variations in the specificity of different animal sera have been observed by students of the immunologic reactions of meningococcus. In order to fully understand this phenomenon, it would be necessary to compare the specificity of immune sera produced from different species of animals by means of the method of absorption. It is not as yet possible to undertake this kind of an investigation of *S. hemolyticus*. The observation has been made, however, that rabbit sera showing nonspecific cross agglutination reactions in general fail to manifest corresponding cross protection reactions.

Whenever it has been possible to raise the animal virulence of strains of *S. hemolyticus*, the evidence obtained from the agglutination tests has been confirmed by that gained from the protection reaction. In all instances in which this has been done, the one reaction has corroborated the findings of the other. The performance of reliable protection tests has been made possible by the production of sufficiently high titer anti-streptococcus sera, and by the possibility of raising the animal virulence of a certain number of strains to a high degree. The types of *S. hemolyticus* have been noted as Type S 3, Type

S 23, Type S 60 and Type S 84, from the serial numbers of the representative strains. This nomenclature is not put forth as a final one, since we realize that probably many other human types exist, to say nothing of the bovine and cheese varieties, and that the proportional distribution of the different varieties pathogenic for human beings may be very different from that represented by this work. *Streptococcus* is the largest of all pathogenic groups of bacteria, and many years will be required to bring out the information necessary to the perfecting of an adequate classification.

It is of considerable interest that all the members of Type S 60 ferment mannitol, and that none of the members of the other groups so far encountered ferment this sugar. A few unclassifiable strains, however, have been found to be mannitol fermenters.

This work has cleared up a number of points about *S. hemolyticus* which have been in dispute for years. In the first place, *S. hemolyticus* of human origin is not a unit type as was previously supposed, but probably consists of a number of types, at least four of which have been definitely identified. Previous investigators have stated that freshly isolated human strains change their antigenic properties on animal passage, and that the latter procedure for the development of animal virulence gives a common antigenic character to all strains. We have found no evidence to support this contention—in fact, immune sera produced with human strains that have never been passed through animals afford a high degree of protection against strains that have received many animal passages. In addition, the antigenic differences between strains of *S. hemolyticus* which have been passed through animals are quite as distinct as those between strains which have not been so passed. The types of *S. hemolyticus* have been studied almost exclusively from the respiratory tract and from a limited source of supply, and there is some reason to believe that those which produce cellulitis, erysipelas and septicemia may be of somewhat different character. It is, therefore, readily seen that but a beginning has been made in the classification of *S. hemolyticus*, and that before the classification is complete, and the relative dominance of the different pathogenic varieties determined, much work must be done.

The Relation of Streptococcus Hemolyticus Carriers to Streptococcus Epidemics in the Army.

BY CAPTAIN FRANCIS G. BLAKE, M. D.

The widespread hemolytic streptococcus infections that have occurred in the army have resembled hemolytic streptococcus infections in general in that they have been truly epidemic in character and have been almost entirely secondary, not primary infections. These infections have in large part affected the respiratory tract because the predisposing diseases which have prepared the soil for secondary streptococcus invasion have been respiratory diseases—measles, influenza and pneumococcus pneumonia.

The relation that hemolytic streptococcus carriers have borne to the development of these streptococcus epidemics is one of the most important phases of their epidemiology. Three types of streptococcus carriers must be recognized: (a) Chronic carriers, individuals who harbor hemolytic streptococci in the crypts of their tonsils over long periods of time; (b) contact or temporary carriers, those who acquire the hemolytic streptococcus and carry it for a relatively short time without its causing them any apparent injury; and (c) acute carriers, those who acquire the organism and in whom it produces disease.

Two points of view with respect to the relation of streptococcus carriers to streptococcus epidemics have been advanced. The first is that the streptococcus infections are autogenous in origin, arising from streptococci innocently harbored in the tonsils. The other is that the secondary streptococcus infections are in large part due to invasion of virulent strains from outside the body—that is, to contact infection. Examination of the available evidence would seem to indicate that the theory of contact infection is the only logical one with respect to the widespread streptococcus epidemics that have occurred in the army. This opinion is supported by studies made at Camp Pike, which showed that in the absence of a streptococcus epidemic the incidence of streptococcus carriers among normal men and among patients admitted to the base hospital with measles, influenza or pneumonia was relatively low, not exceeding 10 per cent in any of the groups studied. These may

be considered chronic carriers. Following the outbreak of an epidemic of streptococcus infections the incidence of streptococcus carriers among normal men and among patients admitted to the base hospital with influenza showed an increase of from 100 per cent to nearly 400 per cent. This increase of carriers was due to the dissemination of streptococci coincident with the epidemic, and represents a group of contact carriers. Secondary streptococcus complications occurred exclusively among these contact carriers, chronic carriers of hemolytic streptococci among patients with measles, influenza and pneumonia remaining free from streptococcus complications. Highly fatal ward epidemics of streptococcus pneumonia among patients with influenzal pneumonia were shown to be due to contact infection and were directly traceable to acute carriers of hemolytic streptococci introduced into the wards in which streptococcus epidemics broke out.

Even should it be granted that a large proportion of the population innocently harbor hemolytic streptococci in their tonsils as chronic carriers, it is difficult to maintain the theory of autogenous infection, since it predicates an equal coincidence of streptococcus complications of measles and pneumonia at all times, an occurrence which is quite out of harmony with the truly epidemic character and strikingly selective incidence of these infections as they have existed in the army.

The relation of chronic carriers to the development of streptococcus epidemics is uncertain and must remain so until means are available for showing whether the hemolytic streptococci harbored by them are immunologically identical with those responsible for the epidemics. It is not impossible that they may be the initial source of these epidemics. From the point of view of prevention it would seem wise to consider this assumption as true until it is disproved or otherwise. It must not be overlooked, however, that the starting point may equally well be found among a number of acute carriers represented by cases of streptococcus tonsillitis, which are probably not infrequently present among large groups of drafted men at the time of their arrival in camp.

Sufficient evidence is available to show that the contact or temporary carriers of hemolytic streptococci bear an intimate relation to the streptococcus epidemics of the army, even if

only a time relation. It seems not improbable that they represent to some extent the intermediate hosts, if the term may be used, which help to disseminate the streptococci and assist in increasing their virulence by frequent passage. It is equally possible that the contact carrier plays only a passive rôle except in so far as he becomes an acute carrier in the presence of a predisposing disease.

The part played by the acute carrier in the spread of hemolytic streptococcus infections cannot be too strongly emphasized. It has been clearly shown that he is an actual source of great danger. The introduction of an acute carrier into a ward devoted to the care of respiratory diseases may be followed by a rapidly spreading and highly fatal epidemic of streptococcus pneumonia, which is comparable in all respects to the old time hospital epidemics of puerperal sepsis. Rigid isolation of every such case, whether it be a mild streptococcus tonsillitis or a severe streptococcus pneumonia, is the clear indication.

DISCUSSION.

COL. F. F. RUSSELL (U. S. A.): Mr. President, last night in his address Dr. Flexner drew attention to the question of epidemiology and recent epidemics, and in tracing the history of influenza showed that it probably had a home at some place on the Russian-Turkestan frontier, and that from that home it spread over the world from time to time; that anterior poliomyelitis spread over the world from time to time from its home in northwestern Europe (Scandinavia). The streptococcus problem that we have just heard about represents in a somewhat different way the same condition.

We have had from time to time epidemics of streptococcus infections, and the papers that we have heard present the last and best work that has been done in tracing back the epidemics to their home, which is in this case a widespread endemic home. We apparently have the seeds of an epidemic always with us, ready to break out when the conditions are favorable, as they were during the war. During the first part of the war measles was the primary disease which so altered the respiratory mucous membrane that the hemolytic streptococcus was enabled to invade the respiratory organs and pro-

duce a terrible epidemic of bronchopneumonia with which you are all familiar.

The experience of last year which Capt. F. G. Blake has so well described shows that the same conditions surrounding streptococcus pneumonia are practically the same as those surrounding erysipelas and puerperal fever, and that one ought not to admit into a ward full of patients with pneumonia or respiratory disease of any kind, a case of streptococcus pneumonia any more than he would think of admitting a puerperal fever case into a ward full of puerperal women.

In these papers, which we have been so fortunate as to have today, we have gone a good step further and gotten down to cases that are on the borderline. There is no doubt, I think, that we can all accept Captain Blake's point of view that the case of acute virulent streptococcus disease is the source of danger to everyone with whom it comes in contact in a ward.

I think these papers show quite clearly what our work is to be. We must study the prevalence of a chronic streptococcus carrier. Whether we will find in civil life in times of peace when things are settled that the streptococcus carrier during the winter season is as common as it was in the camps or not, is the first thing to find out.

We want to know what is the duration of the disease, whether the associates of the chronic carrier remain healthy or develop disease.

Along the lines which Dr. Dochez has started we can work on the bacteriologic side and try to find out whether the streptococci obtained from these chronic carriers are potentially able to cause epidemics of streptococcus diseases. The whole question of the streptococcus from its bacteriologic standpoint has been most difficult, and although it has been taken up from time to time to solve special problems, the work has languished frequently and even gone backward from time to time; but I think this work which we have heard today represents an advance that is greater than anything that has happened in recent years.

So long as we were unable to differentiate clearly between different kinds of streptococci, very little progress could be made. The field was too broad, and it was impossible to make

progress, but in the last two years the field has been much narrowed.

We know that the streptococcus pyogenes or the hemolytic streptococcus is the cause of the severe infections. The other, nonhemolytic streptococci, we can afford to disregard completely in this respect; that throws out an enormous number of streptococci which need not be further considered in this connection. Then we have a large number of hemolytic streptococci which are found in milk and cheese and bovine mastitis. We have also found methods and good reasons now for excluding those from consideration. They do not seem to be of any importance in human pathology, and that narrows the field very greatly until we have now a hemolytic streptococcus which comes from human sources and which is found in these epidemics and also in the acute and chronic tonsillitis.

These organisms are all we need to study, and Dr. Dochez has shown how it is possible to split them up into four groups which can be further studied. We have got to find out some way of telling whether they are virulent or not, and whether they are pathogenic to human beings. Those are two difficult problems, but, perhaps, they are not insuperable.

Of course, that solution for our difficulty during the war was not possible. We couldn't very well break up our camps and send the men home. It was done, however, in the Civil War, and some regiments of Southern troops were disbanded and sent home because of measles. Now, we have got to work out some more satisfactory solution for taking care of streptococcus cases in a hospital than by refusing to take them in. That it can be done I think is reasonable to believe, and by following out the recommendations which have been read here we will go a long step toward preventing cross infections in hospitals due to streptococcus.

We will have opportunities, I think, in civil life just as well as in the army during the war, to study out these problems—perhaps better opportunities, because we were so swamped with the enormous number of cases that not everything that we wanted to do could be done; but we have at least gotten some general principles to work upon, and in our children's hospitals, and especially in the nose and throat wards, this subject can be followed out. We can trace the natural history

of streptococcus infection of the tonsil from month to month and from year to year. If we can find, each of us, a couple of chronic streptococcus carriers and study them as long as they remain carriers without giving any treatment, we will learn the duration of the disease, and whether secondary cases arise from those primary foci—that is a problem which must be solved before we will know just exactly where we stand, and that can be done much better in our hospitals in time of peace than it could be done during the war.

I think that nothing which has come out of the war has been any better than this work on streptococcus infections. I think that now the field is pretty clear. We know what we are dealing with, we know what the problem is, and there is nothing to prevent us getting together and making a program and working it out through as many years as may be necessary to bring it to some satisfactory solution.

DR. STANTON A. FRIEDBERG, Chicago: One of the readers made the statement that it is pretty well agreed that hemolytic streptococci are not very often found in the throat in the absence of epidemics. My experience in the examination of tonsils, while I was engaged in some focal infection work, showed that quite a number of tonsils, perhaps sixty per cent, contained hemolytic streptococci in their depths.

We are handicapped, of course, to a great extent by the fact that we have not the same possibility of obtaining aid in regard to the virulence of the organism that we have in the case of other carrier diseases. The laboratory work is progressing along this line, and no doubt before long it will be of considerable aid in solving this factor.

While at Camp Doniphan, we had a rather extensive diphtheria carrier epidemic. We discovered that in every instance of a chronic carrier there was an underlying pathologic condition at fault. When this was corrected the carrier condition disappeared.

Emphasis has been made particularly upon the condition in the tonsils. We found that there were other sources responsible for the dissemination of infection, and that led to a more careful examination of the nose. There are quite a number of cases where sinus disease is just as potent a factor in dissemination. In these cases the tonsils may be removed, but

the condition will go on just the same. I think if we follow along the lines that we have found to be efficient in other carrier problems, we are going to progress from a clinical standpoint. We will have to do this until we can get more clinical aid from the laboratory.

From a clinical standpoint, when we find a chronic carrier with a pathologic process present, even though we are not able to determine the virulence of the organism, we are justified in correcting the pathologic condition.

THE PRESIDENT: We have a distinguished visitor, who has done a great deal of work in straightening out bacteriologic problems, Dr. Swift. We will be glad to hear from Dr. Homer F. Swift.

DR. HOMER F. SWIFT, New York: We have not touched upon the other broad field of the nonhemolytic streptococcus and their relation to focal infection, a much more difficult field probably than the one we have heard discussed this morning.

The conditions of the war have brought out this other phase of the problem, hemolytic streptococcus, and you can readily see from the discussion this morning in what an early stage of the problem we are at present, and I think it is well to keep in mind the relation of our present state of knowledge to the total solution of the problem.

We are now probably going back to a more or less peacetime basis, and the relation of the carrier to the general problem will be that of a peacetime basis. In the subject of chronic carriers, such as diphtheria and meningococcus, the experience in the Expeditionary Forces, not only in our own but in the British Army, show that the simple determination of carriers by the laboratory was not the whole problem in controlling the spread of disease, and that is the part of the problem that I think we ought to bear in mind—that the average medical officer was liable to cast all of the responsibility up to the laboratory man in controlling the spread of infection. If there was an outbreak of diphtheria or one or two cases, he would think that the determination of a carrier in his company was sufficient to stop the spread of that infection.

We finally came to the conclusion that the examination of the throat twice a day, the use of the stick of wood in depress-

ing the tongue and looking at the throat, was as important a factor in stopping the spread of infection, as was the mere culturing the throat, and I think that that just brings up the problem that the clinician, the man who is examining the throat every day, is going to help as much—maybe not as much in adding new knowledge, but in the practical control, as much as any other person.

SIR ST. CLAIR THOMSON, London, England: This is the most interesting paper that I remember to have listened to since I heard Metchnikoff speak on phagocytosis. I am not in a position to judge it, but it strikes me that it may be true of what Carlyle said of nations. He said "that no nation which thought itself doing a great deed was doing a great deed; that the great deeds were done by people who were not aware of it." And this symposium which we have listened to this morning, I think, without exaggeration, may turn out epoch marking, immensely so.

I think, sir, although as I say I am not able to appraise the value of the paper, but I think I am able to appraise the temper in which it has been produced, and that is the thoroughly scientific spirit. The few points that I wished to ask about have been entirely settled by Captain Blake's summary, which shows the difficulties which, as I say, is the true scientific spirit. I hope this symposium will go forth to those who are able to appraise its value. It is of interest to me as focusing once more our attention on the mouth.

DR. NORVAL H. PIERCE, Chicago, spoke to the query occurring in one of the papers of the symposium: "Is the chronic carrier dangerous to himself?" After returning to private practice I selected approximately twenty-five patients who had been referred for advice as to the justifiability of removing their tonsils. These patients lived under the best conditions and suffered from myositis, arthritis or neuritis to a greater or less degree. Some complained of occasional slight soreness in the throat; others did not. Some exhibited peritonsillar fibrosis, others did not; some hyperemia of the anterior and posterior pillars, others not. Cultures were taken from the tonsils of all these cases for a period extending over a month or six weeks, at intervals of several days. In taking a culture the tonsils were everted, the juice expelled by pressure and

the platinum needle passed down to the bottom of the crypts. Every culture yielded a hemolytic streptococcus. In this regard the cases could not be differentiated. However, they could be divided into two classes. In one class, and that the majority, were the patients with normal temperature. In a second class, a minority (and this is the point I wish to register), were the cases which exhibited a subfebrile temperature and a leucocytosis constantly or at intervals. In a certain percentage of the latter class it was found that by careful irrigation, massage and disinfection with nitrate of silver of the crypts of the tonsils, the temperature and leucocytosis returned to normal. If an interval of time was allowed to elapse without the employment of these procedures the temperature and leucocytosis returned, to disappear when the procedures were resumed. This would seem to prove that some chronic streptococcus carriers are demonstrably dangerous to themselves. It also is a point in aiding us to intelligently differentiate the tonsils which should or should not be removed.

Dr. D. BRYSON DELAVAN, New York: The disinfection of carriers has engaged my attention for the past two years very earnestly. I cannot go into the scientific side—that is far beyond most of us and must be left to the gentlemen who have been working the matter out—but there are one or two practical points which seem to me to need a little clearer understanding.

At the Willard Parker Hospital I understand that all diphtheria-carriers, children, have their tonsils removed. Now, in my own experience, and in two words, I can illustrate what I want to say: the tonsil is not by any means the only focus of infection. Here is a series of twelve cases of diphtheria carriers. In all, treatment has been carried out. They were all adults, all young women, nurses, had been treated with waters and various gargles of disinfectant character, and all had remained with positive cultures. Under the use of the dichloramin-T chlorcosane solution, applied after the nasal cavities, upper pharynx and the tonsil had been thoroughly prepared, as I have already described before the association, and the surfaces cleansed of secretion, the cultures in these cases became and remained negative in three cases after one treatment, in two cases after two treatments, in four cases

after three treatments, in two cases after four treatments, and in one case after eight treatments, and in not one case did the tonsils have to be removed. There was no tonsillectomy in any one of these cases.

Of course, as Dr. Friedberg has told you, where the lymphoid adenoid, either of the tonsil or upper pharynx, or any part of the lymphoid circle of the throat are invaded deeply, they must of necessity be removed, but in the ordinary case I think the treatment without removal will reach a large number of cases. At least it is worth while to apply that treatment to test it, and not to remove the tonsils in every case, but to use the treatment for a few trials and if unsuccessful then operate.

DR. T. PASSMORE BERENS, New York: I asked Dr. Bryan just now whether he was including the tonsil exclusively, and he tells me not by any means, that all of the upper air tract is subject to become infected and become chronic or acute carriers, and of course, I agree with this statement.

DR. JOSEPH L. GOODALE, Boston: In making this introduction of the silver nitrate, I think we should avoid trauma or anything simulating a direct wound of the crypts. We should endeavor to go in and out again with the least damage to the parts possible. We should not apply the treatment in the stage when the individual is still making his antitoxin, but only after he may be conceived to have manufactured all which he is capable of in that particular attack.

In Dr. Bryan's reply or in the reply of the other reporters, I should be glad if they will give us a statement regarding the desirability of excising tonsils during the epidemic; whether the cases destined for tonsillectomy should be kept under any special mode of treatment, whether they use general or local anesthesia, and whether the use of a general anesthetic in those conditions is in their opinion detrimental.

In the first place, during the stage when in the system there is proceeding the formation of antitoxin, we should do nothing in the way of sterilizing or endeavoring to sterilize the tonsils, because the natural process through which the system throws off the disease is the formation of toxin which stimulates the formation of antibodies, thus rendering the tissues less favorable for the further growth of the nitroorganisms.

On the other hand, I think that we find a certain condition where silver nitrate has been of very great value, and that is after suffering with debility and perhaps occasional exacerbations of his fever. If we find under those circumstances certain of these crypts which are more or less occluded and which contain white puriform material, and if we apply silver nitrate or if we are able to enter the crypts and inject gently into them through a canula some silver nitrate solution, I believe that the individual in the majority of cases will promptly experience a distinct sensation of relief.

Col. Russell and I have had a few discussions, most of them friendly, bearing on the nose and throat topics. I was very much interested in the recommendations which were quietly slipped in, at his suggestion I think, at the end of one of the papers. I think I can make these recommendations, from the standpoint of the otolaryngologist, a little more crisp. In other words, I should say, "No recruit should enter the army with an abnormal nose or throat." If a recruit is found in the army with an abnormal nose or throat, both, if possible, should be made normal. Every case of acute tonsillitis should be isolated, in spite of the difficulty of bringing this about. None of these three things, and I for one consider them essential, were fully accomplished during the war just ended.

DR. GREENFIELD SLUDER, St. Louis: A question simply: Was any observation carried out upon the lingual tonsil? It seems to me that these observations have all referred to the faucial tonsils.

DR. JOSEPH H. BRYAN, Washington (closing): Mr. President, it was not our intention to maintain that the tonsils were alone the carrier, but the tonsil evidently is the principal source of infection. The upper air passages may become involved secondarily from any ascending infection, just as the pneumonia is a descending infection. Now, after the tonsils are enucleated and the fauces are perfectly normal, there may be still infectious conditions in the nasal pharynx or in the sinuses, but I believe that those cases are generally of a secondary nature and will clear up under local treatment.

In regard to the lingual tonsil, I don't believe that we carried that out, but if there has been any secondary involvement of the lingual tonsil after the faucial tonsil had been removed

and the cultures had been made, there would have been evidence of a positive culture from that region.

With regard to the enucleation of the tonsil during the height of the epidemic, the object is to get rid of this source of infection provided, other conditions being equal, it is necessary to remove the tonsil even in the height of an epidemic.

In regard to the use of the anesthesia, we removed the tonsils both under general and local anesthesia. Personally, my preference is for general anesthesia, other conditions being favorable and there is no acute condition, no acute inflammation of the upper respiratory tract or any heart or kidney involvement. The enucleation of the tonsils under local anesthesia has many advantages, and I think many disadvantages, particularly when you have a hemorrhage.

DR. HENRY J. NICHOLS, U. S. N. (closing): In regard to the importance of the tonsil as a focus of infection, I feel a little responsible for committing Dr. Bryan to that, possibly because I made a number of cultures of different areas of the nose and throat, including both sides of the nose, the saliva and as many different areas as we could pick out, and always the tonsil gave the strongest culture; then when those tonsils were removed the rest of the area became free of streptococci. Along the line of Col. Russell's suggestion that the laryngologists take up some of these problems, I think that if some of the laryngologists would find it convenient to study cases who had had their tonsils properly removed, some light would be thrown on this subject from the point of view of the carrier problem. And my impression is that you will find very few carriers among such cases. You will find carriers among men who have had their tonsils improperly removed, as a very small shred of tonsil tissue apparently can continue to carry the organisms. It would seem that this subject could readily be cleared up by follow up observations after tonsillectomy in carriers of streptococcus hemolyticus.

My experience has been that it is rare to find streptococci in the upper air passages, outside of the tonsils and immediate neighborhood.

I would like to say one other thing of a sort of general nature—that those of us who are working from a laboratory point of view sometimes get a one sided view of our own

importance, simply because we don't always go along hand in hand with the clinical workers as we should. In the recent laboratory period of the study of syphilis it got to be so that the practical question of the treatment of the patient would be referred to a laboratory man who did not know about the patient as a human organism rather than to a clinician who ought to know all about him. While I appreciated the invitation to meet the clinician, I think also that the society should be congratulated that Dr. Bryan had tried to develop the laboratory and the clinical side of this problem hand in hand instead of one pushing the other. We laboratory men like to think that we take the initiative in things and lead the clinicians in the way they should go; at times, perhaps we do, but that is a one sided view of things. We have to work hand in hand, and it seems to me very important that this society of practical laryngologists has taken enough interest to want to be the leaders rather than to be forced along later on.

MAJOR ALPHONSE R. DOCHEZ, U. S. N. (closing): I should like to draw attention to one point in which our knowledge is still very defective, and on which I think it is most important that statistics should be collected. You may remember that some years ago Smillie studied the incidence of hemolytic streptococcus in normal throats, and his report showed that it is present in approximately one per cent of cases. These cultures presumably were made by swabbing the throat or the tonsils, and it seems important at the present time to determine whether these statistics would be materially varied if careful cultures were made from the tonsils, preferably making cultures from the deep portions of the tonsil. This would show us whether the incidence of hemolytic streptococcus in normal individuals, when cultures are made simply by swabbing the throat, is materially less than when these cultures are made from the deeper parts of the tonsil.

The cultures, of course, from the tonsil should preferably be made from individuals who have relatively normal tonsils.

CAPTAIN FRANCIS G. BLAKE, U. S. N. (closing): As I remarked in my paper, it seemed to me that the clear indication is for the complete isolation of the acute carrier, and I am very glad to hear Dr. Goodale's remark that the ordinary case of

tonsillitis should be absolutely isolated. I think that should be considered as essential as the isolation of cases of more severe streptococcus infection.

The Extraction of Foreign Bodies From the Deep Portions of the Face by the Natural Route.

BY MAJOR LA MAITRE,

PARIS, FRANCE.

(By Invitation.)

I shall speak very briefly of the removal of foreign bodies from the maxillopterygoid fossa. I removed, I do not recall the exact number, but about forty-two or forty-three foreign bodies from the maxillopterygoid fossa. I adopt a special technic, which is quite different from the technic which is usually used. Generally it is through the skin route. After having made an incision of the skin the foreign body is removed, and I may show you, among many others, one case in which a general surgeon had tried to remove the foreign body in that way. This makes an incision, which is always disfiguring. It must also be borne in mind that here the facial nerve, the psychopathic process and the ascending ramus necessitate a long and difficult operation.

Instead of passing through the skin, I tried (and succeeded) in every case to operate through the mucous membrane through the vestibulum of the mouth, by the natural route. For instance, in the case you have seen the photo of (and here is the radiograph) it was very easy to remove the foreign body that a good surgeon might also be able to remove by the classic external route.

Regarding the technic: The incision is made in about the same manner as an incision made when we wish to open the maxillary sinus, but this incision is a little back of that. This enables us to reach a region which is between the ascending ramus, which is outside, and the maxillary sinus, which is inside, through this canal; the mucous membrane of course being incised, it is possible to go very far, very deep, and remove the foreign body.

The help of the radiograph is very important, and it can be used in three different ways: First, the classical radiogra-

phy, which gives an idea of the location of the foreign body and enables one to choose the route and, in that case, choose the natural way. I think it is very important to put a probe in the mouth at the place where we intend to open the mucous membrane in order to have an understanding of the location of the foreign body and to enter the mucous membranes with the probe instead of through the skin incision.

But more important than that is the advantageous manner in which we may work in cooperation with the radiographer. It is not always the same radiographer. I worked with one man during three months, one time, and I must remark on the great difference in the way we were able to work together at the beginning than at the end of the time. At the beginning it is very difficult to do this kind of work.

When the mucous membrane is open I put a forceps at the place in which I presume the foreign body exists, and at the time I ask the radiographer to tell me at what place the forceps are in contact with the foreign body. He would tell me, for instance, half a centimeter below or half a centimeter above, and I change my forceps accordingly. Sometimes I myself am able to discover where the foreign body is. Sometimes it is not possible and the foreign body is grasped with the help of the radiographer.

In some cases I was obliged to go through the sinus itself. If the sinus is involved, it is better to follow the route that the foreign body itself has followed, but generally, except in cases where the frontal sinus is involved, I prefer to go outside the sinus.

Sometimes the foreign body is very deeply seated, very close to the lateral wall of the pharynx, and it is very difficult to remove it because the external area of the subpterygoid fossa is like a wall between the foreign body and the forceps. In that case it is possible (and I have done it) to remove the foreign body by excision of the external area, which is a difficult way to approach the foreign body.

Now, about the danger of this operation. I may say that there is no danger at all. I have had no hemorrhage during or after operation. I had also some annoyance about the muscles, and I may state that on the first day there was a certain degree of muscular tremor, but this tremor disappeared

in a few days, and I may say that sometimes the operation enabled me to overcome some adhesions and in some cases to suppress some tremors which existed before the operation.

In conclusion, it is my firm conviction that the operation through the pterygoid fossa, in the same way that the maxillary sinus is, is in the province of the laryngologist and neurologist because the best surgeons for that work are those we have.

DISCUSSION.

DR. H. P. MOSHER, Boston: I was exceedingly interested in the paper of Professor La Maitre because in 1915, when I served a short time with the British, I had a few of these cases and extracted the foreign body by the only route then known to me—the external route, and my troubles were many. I am very much interested in the route he describes, and if it should become my fortune to have any cases of this kind in the future I shall certainly resort to it. I do not quite see the advantage to be gained, however, in cases of ankylosis of the jaw by working through the mouth. It seems to me that a pretty wide incision is necessary in many of these cases in order to get all the bone out that you should. For the present, although I would like to follow Professor La Maitre, I think I shall stick to the external route.

DR. N. H. PIERCE, Chicago: I have had the pleasure of being in the same beautiful city as Dr. Le Maitre through some months, and I availed myself of the opportunity of seeing him operate on these cases. I have also had the misfortune of attempting to remove some of these foreign bodies that apparently were rather easy to extract and been very much disappointed. The one thing that struck me with especial force was the necessity of having a trained fluoroscopist to work along with you. Of course the observer uses his instrument while you are working and watches the approach or the divergence, as it may occur, during the operation. One cannot lay too much stress on the importance of this method in the removal of foreign bodies in the depths of tissue anywhere in the body, and especially in the face and neck.

Unfortunately, at our head hospital we did not get our fluoroscope until we became a well organized general hospital,

but we had the opportunity of using this method after a while, and we were very greatly aided in discovering these bodies largely in the deeper regions of the face. It is a very important addition to our procedure of extracting the foreign bodies. For one, I congratulate Dr. Le Maitre for the advancement he has made along these lines.

THE PRESIDENT: At Bellevue Hospital, with which I am connected, we get a great many gunshot wounds, perhaps ten or twelve a year, which formerly, before the Head Surgery was established, were taken care of by the General Surgeon, but latterly they have preferred that we take care of them, and they have been most bothersome. They are pistol wounds usually, attempted homicide or murder, and they have given us considerable trouble. We have usually tried the external route, and it has been puzzling. We have not in our operating room the facilities for working with the fluoroscopic screen, so it has been a puzzle many times to get these foreign bodies out. We have succeeded usually pretty well, but at the expense of considerable time, loss of blood and not always with the saving of the patient in bad cases. I recall one case where one of my surgeons was operating for an hour and a half on a bullet that had lodged in the pterygomaxillary fossa, who thought he could get it by the external route. Finally the house surgeon put his finger in the patient's mouth, after the surgeon had been operating an hour and a half, and there was the bullet right under the mucous membrane and easily shelled out from a large hematoma surrounding it. It would have been much easier to have located that with the fluoroscope. The radiograph did not show exactly where it was, but if we had had a fluoroscope and a probe it would have simplified matters very much.

An Unusual and Interesting Case of Nasal Syphilis.

By COL. CHARLES W. RICHARDSON, M. D.,

WASHINGTON.

~ The speaker reported a case of a rather unusual type of syphilitic infection of the mucocutaneous border: A woman of fifty, otherwise healthy, presenting nothing of interest in her family or previous history, developed a catarrh of nearly

six months' duration, when a small growth developing issuing from the left nasal orifice. This manifested itself in June, 1918. When seen by Dr. Richardson in January, 1919, it was quite a large mass protruding from the nose to near the border of the upper lip. It was nodulated, grayish white in color. Perforation of septum in cartilaginous portion; necrosis of lower portion of inferior turbinate; scar on soft palate. Diagnosis: Condylomata, syphilitic. Wassermann made immediately with double positive result. Salvarsan administered, with the usual rapid result and disappearance of growth. Dr. Richardson insists upon holding these patients under treatment until full cure is obtained.

DISCUSSION.

DR. J. P. CLARK, Boston: I have seen a good many cases of syphilis of the nose, and these three points I want to especially emphasize. It is not recognized by the general practitioner. The lesion is usually very late in appearing, and it occurs often in cases where there is no history of previous manifestation of syphilis. I have made some notes of a number of cases of syphilis of the nose which I have seen, but I will read only a few notes of the last case that I saw illustrating these points. A man, H. P. R., 41 years of age, married in 1903. He has a girl fourteen years old and a boy nine years old. He gave a history of having a cold last July. I saw him in October, 1918. He said his nose had troubled him since, stopping up at night. His physician had been treating him for hay fever all through the summer, but without any benefit to the symptoms. He had a purulent discharge from the nose. There was a symmetrically rounded swelling, about five centimeters in diameter, at the upper central part of the forehead (gumma). Tenderness on pressure over this tumor and at the root of nose. Patient weighed 119 pounds. There was a marked swelling of the septum, almost obstructing right nostril. Mucous membrane very red, with small ulcers on septum, dry crusts in both nostrils. A Wassermann test was weakly positive. He was referred for general syphilitic treatment and was seen again in April, 1918, and weighed 129½ pounds, had good color, and all local signs of syphilis had disappeared. There was no history whatever of the primary

lesion. He had been a student in Paris before he was married, in the early 1900's (he was married in 1903), and had been exposed, but had never had any lesions of syphilis.

Delayed Secondary Hemorrhage Complicating Tonsillectomy.

BY VIRGINIUS DABNEY, M. D.,

WASHINGTON.

Secondary hemorrhage is comparatively rare, and one occurring ten days after operation is especially so. The writer presents four cases of secondary hemorrhage delayed beyond twenty-four hours after operation for the removal of the faucial tonsils. Two of these were under local anesthesia without adrenalin, and were tonsillectomies; the others were under ether and the cold snare.

The first case was that of a girl of eighteen, operated under local anesthesia, hemorrhage occurring on the second day. Ice placed and held firmly in the fossa checked the bleeding.

The second case, also local anesthesia, free bleeding during operation, secondary hemorrhage six hours later. Ten days later, free bleeding while patient was walking in the street.

The third case was operated upon by another surgeon one week previously, and there had been much difficulty in arresting the flow of blood at the time of operation. He remained in hospital five days, with no bleeding. Two days later he was awakened by a sensation of strangling and his mouth full of blood. The flow was so persistent and profuse, and the throat exceedingly irritable, so that all measures used failed to control the flow more than for a few minutes at a time. The patient was brought to the hospital and anesthetized with great difficulty, as he was vomiting blood freely. A jagged tear in the middle third of the posterior pillar was found, clamped, and the hemorrhage ceased.

The fourth case was done under ether and snare, this being the second operation on the tonsils, and more than usually difficult. Six days after operation there was bleeding, with a clot in the fossa. Removal of clot and packing of soft gauze sponge, which was allowed to remain twenty-four hours, stopped the bleeding. A few moments later bleeding recurred and packing was again required with no free bleeding.

No cause can be definitely stated for these delayed hemorrhages. He assumes that the explanation may lie in the separation of a slough, which if it involves vessels, may cause a hemorrhage on the slightest exertion.

He concludes with the following words:

"The further I travel along the road of laryngology the more sensitive I become to tonsillar hemorrhage, the greater becomes my respect for bleeding areas in the denuded fossa. This confession bespeaks, I hope, rather caution than timidity and that wisdom which is said to come with age. I hope I am the safer man thereby; certainly the patient is."

The Disinfection of Carriers.

BY D. BRYSON DELAVAN, M. D.,

NEW YORK.

Of twelve diphtheria carriers, every case yielded to our treatment. Four had suffered undoubted attacks of diphtheria, the rest had not. All had been under treatment for periods varying from two months to three weeks, the treatment consisting of the use of various disinfectant solutions sprayed into the nose and throat and used as mouth washes or gargles. In all it had been ineffective. Under the use of the dichloramin-T chlorcosane solution, applied after the nasal cavities, the upper pharynx, and the tonsils had been thoroughly prepared by the preliminary application of adrenalin and thus thoroughly exposed and the surfaces then cleansed of secretion, the cultures became and remained negative.

Failing at success after a reasonable number of treatments, redundant lymphoid tissue should be removed.

From observations already made on this subject, it would appear that not all varieties of germs show a predilection for the same localities of the upper air passages. Thus the Klebs-Loeffler bacillus, the meningococcus and possibly others seem to show a willingness if not a preference for the invasion of the upper nasal region. While the streptococcus, whatever may be its wanderings in the otolaryngeal realms, appears to elect the tonsil as its chief center of action. The removal of a tonsil thoroughly and deeply infected with the streptococcus becomes, therefore, a matter of necessity, while, on the other

hand, the mere removal of tonsillar tissue in any of the twelve cases of diphtheria quoted above would have been useless.

Whether the tonsils require removal or not, the presence of bacteria in the upper nasal region is sufficient in itself to constitute the subject a carrier, and a carrier he will remain as long as the nasal region remains infected. The proper cleansing and dilatation of this area, together with the efficient application of the disinfectant, does not require an excessive amount of time, and it can be carried out by anyone possessed of a reasonable measure of skill and common sense.

Some Considerations Upon the Present Status of the Etiology and Treatment of Cancer, With a Report of Four Cases of Cancer of the Larynx Successfully Treated with Radium.

BY D. BRYSON DELAVAN, M. D.,

NEW YORK.

Without the knowledge of its causes and basal activities the study of the means for its local relief are, as for many years past, disappointing. But while many able men are engaged in this quest under the best conditions that intelligence and generous outlay can afford, their efforts are largely uncoordinated with each other and, in some cases at least, they are narrow and overtheoretical. Any day some great discovery may relieve us of the present deadly situation. Meanwhile that event might possibly be hastened by the selection of the men best qualified for investigative work, by the elimination of the unproductive and by a better harmony and concert of action among investigators.

Turning back to a consideration of the means of relief now at our command, there are several which relate to the general care of the patient and which not seldom escape the attention of the physician or surgeon in charge. Among these may be mentioned the effect of increased blood pressure upon the development and stimulation of cell growth, the proper selection of food elements as affecting the blood pressure and the chemistry of the body, the effect of certain drugs or of methods of general treatment upon the disease, and the possible influence of the nervous system in connection with it.

The general care of the patient, both before and after treatment, must be carefully studied and more regard than is usually exercised must be paid to the period of convalescence and to that complete recovery from the effects of operation which can only be attained after much longer periods of time than many surgeons are accustomed to allow. Surely some conditions exist which influence the development and growth of cancer. These should be investigated and understood.

The four cases recorded are:

1. Carcinoma of the larynx. Female, aged thirty; first seen in 1916. The superficial growth was removed under suspension laryngoscopy. On March 24, 1917, the growth had much developed. Radium was applied. The disease involved the whole interior of the larynx and the anterior wall of the esophagus. Laryngectomy performed June 7, 1917. Two years later, still wearing a tracheotomy tube, no recurrence. Has acquired a voice of remarkable clearness and carrying power.

2. Male, aged sixty-four; carcinoma of the larynx extending to the left side of the base of the tongue and to the pharynx. Owing to urgent dyspnea, tracheotomy was at once performed.

Because of the extensive involvement, operation was not advised.

On May 23rd three tubes of radium 9.8 m.c. were embedded in the growth for 132 hours. On June 26th one tube 4.9 m. c. was embedded for the same length of time.

July 21st, radium treatment resumed; pack placed over the left side of the neck. All activity of the growth seems to have ceased.

3. Male, aged sixty-two; radium treatment in August, 1918, with radical extirpation of the larynx on January 22, 1919. In June, 1919, the result was in every way excellent, the patient making slow but satisfactory progress in the control of his voice.

4. Male, aged eighty. On September 15, 1918, 880 m. c. filtered through two small m. m. of lead were applied on each side.

Complete retrogression promptly followed this treatment, so that in October 25, 1918, no evidence of disease was present.

DISCUSSION.

DR. D. C. GREENE, Boston: The results of radium treatment have been in certain cases so beneficial that we are impressed with the fact that there is something in it, even though in the great majority the results have not been satisfactory.

One serious obstacle to the success of the treatment is the difficulty of making accurate and constant application of the rays to the exact location desired. We have found that tracheotomy is an essential preliminary.

At the Huntington Hospital radium rays were applied by the method of Curie of Paris, who, as you know, was the first to preserve the emanations in containers holding measured amounts corresponding to given weights of radium. By this means the rays are largely conserved and much wastage is avoided.

Dr. Duane of the Huntington Hospital has prepared containers in the form of small glass seeds which may be inserted and left in the substance of the tumor. Several such seeds containing small measured doses inserted into different parts of the tumor mass by means of a trocar, provide a crossfire, so to speak, between the various points of insertion and increase the effectiveness of a given dose.

Under suspension, with general anesthesia, such insertions can be accurately made in many cases.

When containers are thus applied without screening, it is essential to avoid placing them within 6 or 7 m. m. of normal tissue, otherwise there is risk of ulceration into normal tissue with possibly disastrous results. For example, a heavy dose of radium thus placed in the vicinity of a large vessel may result in ulceration of the vessel wall with fatal hemorrhage, an accident which occurred in a case which I recently saw.

The postoperative treatment with radium, described by Dr. Delavan, is, I believe, a most important adjuvant to operative cure.

THE PRESIDENT: I think there is no question that radium can destroy, does destroy in certain cases, every vestige of malignant manifestation, wherever it may be. I think it is a question of dosage and is due that and a difficult dosage to manage.

Too large a dose results in destruction, not only of the involved area, but of much of the healthy tissue around it, and in certain regions, as, for example, in the neck, in the larynx, is very apt to be followed by disastrous results. These results do not manifest themselves always early, but manifest themselves months and years after its application.

In a case of epithelioma of the larynx which I have referred to here once or twice, an elderly man who refused operation, the dosage was given on the outside of the neck, with marked recession in the laryngeal appearance, but with some thickening. And a year later, to satisfy ourselves what that thickening was, we removed a piece of it and submitted it to the same pathologist, who reported there was still epithelioma present, and it remained in that condition of thickening; more radium was applied; there was still some thickening.

The man a year after the second radium was applied, which was two and a half years after the radium was first applied, had a sloughing of all of the tissues in the anterior part of the neck; the trachea was completely ulcerated through, so that the lower end of the trachea simply stood up in his neck there.

I think it is unwise and unsafe to introduce into the larynx any radium emanation tube without first performing a tracheotomy. If you examine those cases where we have put any in the nose, I think you will see that the amount of swelling which must occur in the larynx, as it does in the nose or in the tonsils or tongue, is such as to render the patient very liable to such a stenosis as to need an urgent tracheotomy. I think all those cases should be tracheotomized before the radium is used.

DR. D. B. DELAVAN, New York (closing): I cannot quite accept Dr. Green's remark with regard to the use of small doses and his objection to the use of large doses. The question depends upon the case.

Now, it is worth while to keep on and to try to find out what is the scientific way of applying it and to apply it in that way, but, after all, that is not the point of my paper.

We want to know—it may be a difficult thing to find out, but we want to know, and we have got to know—what the underlying causes of this condition may be, and until we do, we are entirely in the air; we are acting at cross purposes

most of the time, one with the other; we are theorizing, and our patients are dying at the rate of thirty thousand a year just in the United States alone.

Injuries of the Nose and Throat, Due to Bullet and Shell Wounds.

By J. M. INGERSOLL, LIEUT.-COL., M. C.,

CLEVELAND.

In January, 1918, the Medical Department of the Army converted a modern fireproof hotel at Cape May, N. J., into a hospital, known as the Hospital for Head Surgery.

The first patients in the Otolaryngologic Department were received on April 1, 1918. The average number of patients in the department varied between one hundred and one hundred and fifty.

The injuries to the nose and accessory sinuses and the surrounding tissues varied greatly, and consisted of all sorts of wounds involving these structures. In many cases the eyes were also involved. Pieces of shrapnel and high explosive shell were found in all portions of the head and neck. Shell fragments were also found in all of the accessory cavities, more frequently in the maxillary sinuses than in any other single place. After removing the foreign bodies plastic operations were done to remedy the defects.

The laryngeal cases in some respects were the most difficult type of cases which we had to treat. The laryngeal cartilages and intralaryngeal structures were more or less extensively destroyed, and adhesions formed, causing laryngeal strictures, which necessitated a tracheotomy. Removal of the foreign bodies and all necrotic tissue around the larynx, with free drainage, resulted in recovery eventually. Dilatation of the constrictions finally established intralaryngeal respiration and enabled us to remove the tracheotomy tube.

Vocal exercise in cases of injury of the jaw, pharynx and larynx were exceedingly beneficial in reestablishing the vocal functions and stimulating the injured muscles.

DISCUSSION.

THE PRESIDENT: May I ask Major La Maitre, whether in bringing down that flap he simply takes one piece of bone for

his nasal bridge, inserting it in the middle line, or does he attempt to take two pieces so as to have a sort of roof there?

MAJOR LA MAITRE, Paris, France: Sometimes I include only one piece of bone, when it is a small defect, but sometimes I have two horizontal flaps which permit in certain cases to have a framework more extensive and to sustain the area at the end of the nose. By this method I obtain a primary union instead of leaving a wound which we have in the case of the Indian method which takes longer to cure.

DR. R. H. SKILLERN, Philadelphia: I want to speak a word about the different degrees of injury that some of these machine gun bullets will cause. During the Argonne offensive I happened to see a number of cases of fresh machine gun wounds of the face and neck, and I was struck particularly with some of them with the slight amount of traumatism that they caused.

I recollect particularly one young boy who, three days after he was wounded, was brought to our center. He was shot through the neck, directly in front of the great vessels, the wound of exit being in the midline posteriorly. How in the world that missed those vessels I cannot see, and yet at the end of three days' time the wound had perfectly healed. There was only a dimple in front. I spoke to him and said: "Son, how do you feel?" He raised himself up off his pillow and began to shake his neck and said: "I feel fine, just a little stiffness, that is all. It was remarkable.

I remember another case of a machine gun bullet that transversed the neck from the side. It seemed to have gone through the esophagus, posteriorly to the cricoid cartilage. That boy has no disturbance whatever in speech—only a little difficulty in taking nutrition.

There was another case that was extensively talked about that I did not see, where a machine gun bullet had entered the temple and gone through the brain. After two or three weeks of very stormy symptoms he seemed to recover, but recovered with a nasal discharge, and on examining the nose they found some trouble up in the sphenoid region, and on probing around found something hard there, and finally with a pair of forceps extracted the machine gun bullet from the

left sphenoid sinus. A most remarkable case, the patient recovering entirely.

DR. GEO. M. COATES, Philadelphia: Colonel Skillern's discussion reminds me very forcibly of many cases I have seen similar to the ones he has just mentioned. It is really wonderful how often these machine gun bullets and fragments of high explosive shells apparently went through or near vital structures without causing death or permanent injury.

We saw a good many cases in the hospital center at Allerey that reached us anywhere from fifteen to seventy-two hours after the injury. I only recall a few at this moment, but we had a number of injuries to the cheeks where the machine gun bullet went through the maxillary sinus, tearing out the ethmoids on one side, a large part of the septum and emerged beneath the orbit on the opposite side. These cases healed up with remarkably little deformity or discomfort.

I remember two cases where machine gun bullets had passed into the mastoid and came out in the opposite orbit, completely exenterating the latter. These healed up without any symptoms other than a one-sided facial paralysis. It is often very hard to trace the path that these projectiles could have taken without touching some vital spot and yet they did it. I suppose there is an explanation for this, and that is that we did not see the cases where the projectiles failed to miss vital organs and saw only those that were missed, and it is really remarkable that in so many cases that we did see, these injuries were not fatal.

DR. J. M. INGERSOLL, Cleveland (closing): One of the photographs being passed around shows a soldier in whom the bridge of the nose was destroyed by a machine gun bullet. In the plastic operation to restore the lost portion of the bridge a small portion of the bone over the frontal sinus was transplanted to support the flap coming down from the forehead.

Another photograph shows a rather bad injury on the right side of the face. In this man the outer margin of the orbit and the whole eye were destroyed. The maxillary sinus and the ethmoidal cells and a portion of the right nasal fossa were uncovered. In that case we used such a flap as you spoke of, Major La Maitre, bringing it down from the forehead so

as to cover the maxillary sinus and ethmoid cells and a portion of the nose, and in this way make a new lower lid.

We used such flaps quite frequently in unilateral injuries of the nose, but in no case where the nose was completely destroyed did we use flaps from each side to reconstruct the nose. Your suggestion of the use of double flaps interests me and seems to me to be a very logical procedure.

We tried various methods to provide for a lining of the flaps used to replace the nose. We came to the conclusion that the best method of lining such flaps consisted in covering an aluminum nasal splint with skin grafts and inserting them in the nasal fossa under the flap brought down from the forehead. These splints were held in position by an attachment to the teeth.

In the cases of bad injury of the face and neck we came to the same conclusion you did, Dr. Coates, that in those cases in which the carotid artery was injured the patient succumbed to the injury, and the ones we saw were those who fortunately escaped such injury.

In regard to the mastoid cases: We saw many cases in which the bullet entered one side of the face and passed out through the opposite mastoid, causing facial paralysis. The interesting thing about many of these cases was that in a great majority of them the facial nerve was injured but not severed, and when we removed the foreign bodies and the splintered bone, and in some cases actually uncovered the facial canal, removing all source of irritation, the facial paralysis improved and in many cases became practically well. Of course, we used massage and electricity following the operative procedure.

The Otolaryngological Features of the Influenza Epidemic at Camp Hancock, Augusta, Ga., September-December, 1918.

BY MAJOR GEORGE FETTEROLF, A. B., M. D.,

PHILADELPHIA.

Seven hundred and seventy men were brought directly to the hospital by train and a real epidemic began and in a very stormy fashion.

The first complication requiring attention consisted of many

cases of violent and persistent epistaxis; other phases developed later.

Ear complications were many, and every endeavor was made to attend to these immediately, and for this a twenty-four hour service was instituted for each day.

In a very few days the patient population jumped from 1,500 to 4,000.

The main difficulty met with in examining and treating the patients was securing adequate illumination, as two-thirds of the sick were on porches or in tents. Often the sunlight or diffuse daylight were used. Careful treatment was given all these cases, the ear drum incision when necessary, with not a single mastoid operation performed in October, and only four such operations were performed in November and five in December, of a total of 7,781 cases of influenza.

Epistaxis.—But one obtruding condition was found in the nose, and that was profuse and persistent epistaxis. In every case but one the bleeding point was located at the anterior part of the septum, the so-called locus Kieselbachii. In the one exception a spurting artery was observed on the lateral wall of the nose at the anterior end of the inferior turbinated body. The incidence of epistaxis was the greatest in the first influx of cases. These boys were brought in directly from the troop trains after two days or more of travel, with limited bathing facilities, and it is believed that the irritation and excoriation of the nasal mucosa produced by the train dirt was an important causative factor. Epistaxis became much less frequent in the later days of the epidemic, when the cases were developing in those soldiers who had been in camp for several days.

Sinusitis.—The incidence of sinusitis was exceedingly low. Exact figures are not at hand nor are they obtainable. When a case of this sort developed, a routine spray of adrenalin chlorid 1/7,000 was given every hour, and when the pain was severe the middle meatus was packed for half an hour or more with cotton pledgets saturated in the same solution. All of these cases returned to normal and none required operation for their relief.

Tonsils.—There were very few cases of tonsillitis and still fewer of peritonsillar abscess. During the months of Octo-

ber, November and December there were but 13 cases requiring the evacuation of pus.

Larynx.—Laryngitis was present in quite a few cases and the manifestations in the larynx were of three different types: (1) Diffuse catarrhal laryngitis, with the usual appearance found in this condition; (2) ulcerative laryngitis, with small, narrow, superficial ulcers running lengthwise of one or both cords, and (3) what might be called "asthenic laryngitis."

A section of ulcerated cord from a case of type 2 was submitted to the pathologist, who reported on the specimen as follows: "Section shows mucosa with an irregular loss of substance, with submucosa exposed, which with muscle tissues still deeper, is infiltrated with polynuclear leucocytes. Diagnosis: Acute inflammation of vocal cords with ulceration."

It was characterized by a normal or slightly reddened mucosa, absence of ulcerative lesions and mainly by a marked weakness of the laryngeal musculature. An attempt at phonation would result in a feeble effort to approximate the vocal cords and an immediate discouraged return of the cords to the respiratory position. A similar condition of the palatal and pharyngeal and probably of the esophageal musculature usually was found to be associated with it. The muscular efficiency of the entire throat was very low, and it was tested out in one patient by having him endeavor to swallow a large mouthful of water. The effort at deglutition immediately was followed by a gush of water from his nose and by cyanosis. It was evident that the muscles of neither his soft palate nor of his larynx had the strength to close off the entrances to the cavities which they guard. In a short while he was able by a few weak coughs to clear his larynx and trachea, but for the moment it looked as if he was in imminent danger of suffocation from the water which he was unable to prevent entering his trachea and then was almost unable to expel from it.

The actual cause of his condition could not be determined. Possibly it was a toxic myositis, possibly just a part of the general asthenia, possibly it was due to a toxemic poisoning of the centres in the medulla, really constituting an acute form of bulbar paralysis.

The members of the otolaryngologic staff of the Base Hospital feel that they were in great good fortune to have been

at Camp Hancock during the epidemic. Rarely does a physician or even a collaborating group of physicians have an opportunity of studying synchronously such a large series of cases occurring in people of approximately identical age and living under uniform clothing, housing and dietary conditions. Usually observations on a large number of cases must extend over a long term of years, and under such conditions early impressions and conclusions are likely to grow hazy and later ones assume undue prominence and force. While necessarily conditions in this epidemic were such that accurate record of all phases of the influenza was impossible, still it is felt that so careful an estimate has been made where accurate records were not obtainable that conclusions drawn can fairly be considered as being based actually on numerical fact.

DISCUSSION.

DR. N. H. PIERCE, Chicago: I congratulate the writer on his excellent results in the treatment of acute inflammations of the ear. His methods are founded on principles that have grown out of known pathology in these cases and represent the most modern ideas in the treatment of these diseases. There is a definitely defined rule that the occurrence of mastoid trouble necessitating operation is in direct relationship to the length of time elapsing between the onset of an acute otitis media and the opening of the tympanic membrane. The tympanic membrane cannot be opened too early. It is infinitely safer to err on the side of opening the tympanic membrane early in acute cases. In fact, it is better to open the tympanic membrane in the acute infectious diseases for exploration purposes, even when there is no sign of bulging or very little sign of hyperemia—always, of course, under strict aseptic and antiseptic conditions.

It is curious what a difference there is in the reports of cases from the various camps as to the frequency of mastoid operation. In some camps, especially in the Southern States, it was quite the rule to have one or two entire wards full of operative mastoid cases. I cannot help believing that even in the presence of the very virulent infections from which they suffered there were a great many mastoids opened unnecessarily.

In my own experience in this country and abroad I have performed between thirty and forty mastoidectomies, and in some of these the operation was performed in chronic suppurative processes. Of these cases only one died from complications—that is, of all the cases of acute chronic mastoid trouble that I saw in my experience in this country and abroad but one death resulted from complications, and that was a case where, on the fourth day after the admission to the hospital, thrombosis extended into the right arm, and I believed that nothing in the world in the way of operation could save such a case.

DR. D. C. GREENE, Boston: I would like to add one observation that we made at Camp Sevier. Our experience was very much the same as Major Fetterolf's, with one exception, and that is with reference to sinus involvement. We had, it is true, very few cases of sinus disease in which the clinical diagnosis was made, and we had, unfortunately, very few autopsies in the cases which died, but we did have fifteen cases which came to autopsy in which the head was opened, and the surprising thing was that of these fifteen cases eight showed definite disease of the sinuses. In each of the eight, the sphenoid was involved and in several other sinuses also. It seems evident, therefore, that many cases of sinus disease must have escaped our attention because they did not give clinical symptoms at the time.

DR. GEO. M. COATES: We had an epidemic of influenza at the hospital center in France where I was stationed, although it was rather light in character, and we observed many of the details Major Fetterolf has spoken about. In practically every case that died an autopsy was made, and at every autopsy there was a thorough examination of all the accessory sinuses and the middle ears. If I recollect rightly, in something like 90 per cent we found pus in one or both of the middle ears and one or more of the sinuses—the sphenoid more frequently than any of the others. Almost invariably, these cases before death had given no symptoms whatever of either middle ear or sinus trouble. At that particular time I was almost entirely occupied with administrative work, but as we had no other throat men connected with the hospital I did see a great many of the cases where symptoms were present. I recollect very

few, if any cases of epistaxis, but we did notice many asthenic laryngeal cases characterized chiefly by aphonia, and they bothered us a great deal, because at that time we were having an epidemic of laryngeal diphtheria. We also had a great many gas cases in the hospital, and it was often a hard question of diagnosis with the facilities at hand to determine what these aphonia cases were due to. Our laryngeal diphtheria cases came on very suddenly, and in one or two instances died of pneumonia without any laryngeal examination having been made, the patient having been practically symptomless except for the aphonia. After this, I made it a routine practice to examine the larynx of every case showing any symptoms whatever, and also all the diphtheria and pneumonia cases.

It was very difficult to make competent laryngeal examinations, because our hospital was so crowded. We had very poor facilities for making them, but in a good many cases we were able to make correct diagnoses and a number were saved by prompt tracheotomy.

I want to congratulate Major Fetterolf for the fine organization he had at Camp Hancock for this work. We had attempted to develop an organization at the Base Hospital at Camp Sevier similar to the one he has just described. It was at the very opening of the hospital in September, 1917, and we were very much handicapped because there were only two of us to do the work. We had practically no instruments to work with, our equipment being limited to one set of aural specula, one nasal speculum, one metal tongue depressor, no headlights, no illumination of any kind. We were forced to use, when we could, the daylight and depend on candles or lanterns when we could get them, or electric flashlights. The measles cases came in by hundreds, and it was very difficult work. Afterwards, when we got our system going in proper shape and more help arrived, we were able to see all these middle ear complications practically at their beginning, and yet, in spite of our utmost care, we had, I think, between sixty and seventy mastoid operations. These mastoids were all late cases, made so deliberately, because of the very poor physique of the men we had to work on. If they were measles cases they all had bronchitis, many of them pneumonia, almost all hookworm, and were wretched specimens to do any work

on. We, therefore, attempted to carry them along as far as possible before bringing them to the operating table.

Naturally, under this system we had some fairly bad mastoids, but the only one we lost was a man who came in with brain abscess and meningitis and died in a few hours.

DR. T. P. BERENS, New York: In General Hospital No. 1, during the epidemic of influenza in September and October there were approximately 1,200 cases of influenza brought in.

There was a class of cases up there, however, where the mastoids had been operated on months before, many months before my arrival on the 5th day of June, some of them done in other hospitals, military hospitals, and transferred to us. There were about thirty unhealed, postoperative mastoid wounds, and in all of those cases there had been simply what I might call a scratch operation, excepting that in many of the cases mutilating operation had been done on the external auditory canal. In some of the cases the skin even was absent from the external auditory canal. It made the operations

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INDEX OF THE LITERATURE.

SECTION 1.—LARYNGOLOGY AND OTOTOLOGY— GENERAL AND HISTORICAL.

Alexander, G., and Urbantschitsch, E. War injuries and war diseases of the ear.

Monatsch. f. Ohren., etc., Berlin, 1916—I—241, 570, 609; 1917, 51, 505; 1918, 52, 476.

Amberg, Emil. Some present day treatments of ear diseases in the light of medical history.

Mich. J. State Soc., Grand Rapids, 1919—XVIII—521.

Baker, C. H. Practical points about eye, ear and nose work.

J. Mich. S. M. Soc. Journ., Grand Rapids, 1919—XXVIII—555.

Carmack, J. Observations from nine months in otolaryngology, Base Hospital, Camp Taylor, Ky.

Indianapolis M. J., 1919—XXII—512.

Clark, S. J. Reflex disturbances originating in the nose, throat and mouth.

Texas State J. M., Fort Worth, 1919-20—XV—219.

Delavan, D. B. The value of the dichloramin-T chloro-sane solution (Dakin-Dunham) in the treatment of infections of the upper air passages.

Laryngoscope, St. Louis, 1919—XXIX—47.

Denker, A. The opening of the newly formed university clinic for ear, nose and throat in Halle a. S.

Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1915—XCVIII—219, 243.

Dittman, G. C. The interrelation between orthodontic malformations and disease of the nose and throat.

Minnesota Med., St. Paul, 1919—II—305.

- Dufourmentel, L.** Otorhinolaryngology and surgery of face and neck in 1919.
Paris méd., 1919—XXXVI—184.
- Fisher, L.** Practical value of ear studies.
Laryngoscope, St. Louis, 1919—XXIX—374.
- Fox, H. H.** Autogenous vaccines in the treatment of diseases of the ear, nose and throat.
J. Florida M. Ass., Jacksonville, 1918—IV—360.
- Hagemann, J. A.** The laryngologist as an augur.
Med. Rev., N. Y., 1919—XXV—609.
- Ingersoll, J. M.** Injuries of the nose and throat, due to bullet and shell wounds.
Laryngoscope, St. Louis, 1919—XXIX—624.
- Leenhouts, A.** The nose and throat in their relation to the general health of the body.
Pub. Health, Mich., Lansing, 1919—VII—457.
- Lewy, Alfred.** Focal infections of nose, throat and ear in children.
Clinique, Chicago, 1920—XXXI—20.
- Manasse.** The military phase of ear, nose and throat diseases.
Strassburg. med. Zeit., 1917—XIV—21.
- Neu, G. B.** Amyloid tumors of the upper air passages.
Laryngoscope, St. Louis, 1919—XXIX—327.
- Neu, G. B.** The value of radium in the treatment of neoplasms of the nose, throat and mouth.
Radium, Pittsburgh, 1919-20—IV—12.
- Newhart, H.** The conservation of hearing.
Minnesota Med., St. Paul, 1918—I—161-168.
- Oppenheimer, S., and Gottlieb, M. J.** The importance of blood examinations in the surgery of the nose and throat.
Laryngoscope, St. Louis, 1919—XXIX—178.

- Parsons, J. G.** Otolaryngology and the mortality rate.
J. Lancet, Minneap., 1919—XXXIX—513.
- Walsh, J. J.** Two chapters in the history of laryngology and rhinology.
Ann. Med. Hist., N. Y., 1919—II—23.
- Zimmerman, A.** Further reports on war injuries of the ear and upper air passages.
Arch. f. Ohren, Nasen u. Kehlkopf, Leipz., 1916—XCIX—1-27.

SECTION 2.—RESPIRATORY SYSTEM, EXCLUSIVE OF THE EAR, NOSE AND THROAT.

- Bloomfield, A. L.** Fate of bacteria introduced into upper air passages.
Johns Hopkins Hosp. Bull., Baltimore, 1919—XXX—317.
- Cordier, V.** Alimentary anaphylaxis with asthma.
Arch. de mal. de l'appar. digestif, Paris, 1919—X—287.
- Crowe, S. J., and Thacker-Neville, W. S.** Influenza bacillus in paranasal sinus infections.
Johns Hopkins Hosp. Bull., Baltimore, 1919—XXX—322.
- Knapp, Mark I.** The successful treatment of asthma.
Am. Med., 1919—XXV—642.
- Macht, D. I.** A therapeutic study of benzyl benzoate in bronchial spasm or asthma.
South. M. J., Birmingham, 1919—XII—367.
- Marsh, H. S.** Asthma due to chronic antral suppuration.
Med. J. Australia, Sydney, 1919—I—462.
- Schmidt, R.** Status asthmaticus.
Deutsche med. Wehnschr., Leipz. & Berl., 1916—XLII—1023.
- Sluder, G.** Asthma as a nasal reflex.
J. Am. M. Ass., Chicago, 1919—LXXIII—589.

Walker, I. C., and Adkinson, June. Study XIX. Types of streptococci found in the sputum of bronchial asthmatics.

J. Med. Research, Bost., 1919-20—XI—229.

Williams, W. R. Chronic bronchitis with emphysema and asthma.

Homeopathic Med. Sc., Phila., 1919—LIV—612.

SECTION 3.—ACUTE GENERAL INFECTIONS, INCLUDING DIPHTHERIA, SCARLET FEVER, AND MEASLES.

Atkinson, E. L. Influenza pneumococci in fauces.

J. Roy. Nav. M. Serv., Lond., 1919—V—325.

Blackwell, H. B. Perisinus and epidural mastoid abscess subsequent to influenza.

Laryngoscope, St. Louis, 1919—XXIX—587.

Britton, J. M. Medical treatment of acute follicular tonsillitis.

Southwest. Med., El Paso, 1919-20—III—3.

Burrows, Montrose T., and Suzuki, Yoshio. The study of problems of immunity by tissue culture method. III. A method for determining the resistance of individuals to diphtheria infection.

J. Immunology, Baltimore, Jan., 1919—IV—1.

Chodak, H. H. A case of palatal paralysis following influenza.

Brit. M. J., Lond., 1919—II—344.

Detling, F. E. Treatment of the diphtheria carrier, with special reference to tonsillectomy and adenoidectomy.

Calif. State J. M., San F., 1919—XVII—295.

Finnegan, Francis A. Institutional control of diphtheria.

Boston M. and S. J., 1920—CLXXXII—93.

Gilpin, S. F. Influenza and intracranial lesions.

J. Nerv. and Ment. Dis., N. Y., 1919—I—353.

- Hill, F. T.** A study of the aural complications of the recent influenza epidemic with special reference to the clinical picture.
Laryngoscope, St. Louis, 1919—XXIX—351.
- Holmgren, G.** The aural complications of Spanish influenza.
Förh. Svens. Läk-Sälisk. Sammak, 1918—694.
- Laessle, H. A.** Nasal and pharyngeal sequelae of influenza.
Laryngoscope, St. Louis, 1919—XXIX—103.
- Martin, Louis.** Diphtheria antitoxin.
Bull. l'acad. de méd., Paris, 1919—LXXXII—173.
- McCallum, A. D.** Fatal anaphylaxis following prophylactic injection of diphtheria antitoxin subcutaneously.
Brit. M. J., London, 1919—I—596.
- Monge, C.** Influenza and lethargic encephalitis at Lima.
Riforma méd., Lima, 1919—LX—91.
- Mosher, H. P.** Thrombosis of the internal jugular vein with pyema as a complication of retropharyngeal abscess.
Laryngoscope, St. Louis, 1919—XXIX—638.
- Mudd, S., and Grant, S. B.** An experimental study of a possible mechanism for the excitation of infections of the pharynx and tonsils.
Am. J. Physiol., Balt., 1919-20—XLIX—144.
- Newcomb, W. H.** Surgery of the nose in relation to influenza.
Internat. J. Surg., N. Y., 1919-32—XI—14.
- Richey, De W. G.** Experimental streptococcic tonsillitis: the apparent inefficiency of streptococcic vaccine as prophylacti.
J. Infect. Dis., Chicago, 1919—XXV—299.
- Rothenberg, S.** Influenzal facial neuritis.
J. Nerv. and Ment. Disease, N. Y., 1919—I—449.

- Schorer, E. H., and Ruddock, A. S.** Detection of carriers and missed cases of diphtheria in embarkation and debarkation of troops.
Mil. Surgeon, Washington, 1919—XLV—319.
- Todd, A. T.** Hyperthyroidism in influenza.
Lancet, London, 1919—II—733.
- Tuley, H. E.** Fatal laryngeal edema following influenza.
Kentucky M. J., Bowling Green, 1919—XVII—315.
- Watson-Williams, P.** Latent sinusitis in relation to systemic infections, especially with reference to rheumatoid arthritis.
J. Laryngol., Lond., 1919—XXIV—233.
- Winchell, A. I., and Stellman, E. G.** Occurrence of bacillus influenza in normal throat.
J. Exp. M., Baltimore, 1919—XXX—497.

SECTION 4.—SYPHILIS.

- Watterson, C.** Lesions of the mouth in congenital and acquired syphilis.
South. M. J., Birmingham, 1919—XII—489.

SECTION 5.—TUBERCULOSIS.

- Beck, C.** Reconstruction of nose after lupus.
Internat. Clin., Phila., 1919—III—64.
- Cemach, A. I.** The specific treatment of middle ear tuberculosis.
Monatsch. f. Ohrenh., Berl., 1916—I—430.
- Geiger, Arthur H.** Manifestations of syphilis in the nose and throat.
Illinois M. J., Chicago, 1919—XXXVI—23.
- Meurisse, P.** Tuberculous membranous cast of the bronchus.
Progrès méd., Paris, 1919—XXXIV—354.
- Rice, G. S.** Tuberculosis of the larynx.
J. Am. Inst. Homeop., Chicago, 1919—20—XII—55.

- Van Hoogenhuyze, C., and de Kleyn, A.** Two cases of ethmoiditis; case one tuberculous.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1917—CI—178-182.

SECTION 6.—ANATOMY, PHYSIOLOGY AND PATHOLOGY.

- Allis, E. P.** On the homologies of the auditory ossicles and the chorda tympani.
J. Anat., Lond., 1918-19—LIII—363.
- **Bloomfield, A. L.** Fate of bacteria introduced into upper air passages.
Johns Hopkins Hosp. Bull., Baltimore, 1919—XXX—317.
- Bowling, W. E.** Function of the thyroid gland.
Am. J. Clin. Med., Chicago, 1920—XXVII—38.
- Cheval, V.** Physiology of audition.
Ann. et bull. soc. roy. d. sc. méd. et nat. de Brux, 1919—I—54.
- Crowe, S. J., and Thacker-Neville, W. S.** Influenza bacillus in paranasal sinus infections.
Johns Hopkins Hosp. Bull., Baltimore, 1919—XXX—322.
- Dudley, W. H.** Parosmia.
Laryngoscope. St. Louis, 1919—XXIX—156.
- Fleischmann, O.** The origin of the fluid in the labyrinth.
Arch. f. Ohren. Nasen u. Kehlkopf, Leipzig, 1918—CII—193.
- **Gallahan, J. F.** Consensual reaction in the hearing centers.
Laryngoscope, St. Louis, 1919—XXIX—569.
- Gatscher, S.** The independence of the nervus cochlearis and vestibularis.
Monatschr. f. Ohrenh., Berl., 1917—II—665, 674.

- Guettich, A.** The relation of temperature sensitiveness of the skin with the vestibular apparatus.
Beit. u. Anat., Physiol., Path., Therap. d. Ohres, Berl., 1916-17—IX—113.
- Heiman.** The present knowledge of the function of the eighth pair of cranial nerves.
Monatsch. f. Ohrenh., etc., Berlin, 1919—LIII—52.
- Oetteking, B.** The processus frontosphenoidalis of the zygoma and its bearing on the configuration of the orbit.
Anat. Record, Phil., 1919—XVII—25.
- Richey, De W. G.** Experimental streptococcic tonsillitis: the apparent inefficiency of streptococcic vaccine as prophylacti.
J. Infect. Dis., Chicago, 1919—XXV—299.
- Sporry, R.** About the health and developmental value of proper singing.
Monatsch. f. Kinder., Leipz. & Wien, 1917—XIV—303.
- Wessels, A. B.** The pathogenesis of pachymeningitis due to nasal operations. With report of cases.
California State J. Med., San Francisco, 1919—XVII—383.
- Winchell, A. I., and Stellman, E. G.** Occurrence of bacillus influenza in normal throat.
J. Exp. M., Baltimore, 1919—XXX—497.
- Winkler, C.** Innervation of the semicircular canals in the labyrinth of the new born rat.
Arch. neerl d. physiol., La Haye, 1917-18—XI—556.
- Wittmaack, K.** Comparative examinations of sounds by air conduction in swinging apparatus.
Arch. Ohrenh., Nasen u. Kehlkopf, Leipzig, 1918—CII—96-107. Also,
Beitrag. z. Anat. Physiol. Path. u. Therap. des Ohres, etc., Berlin, 1916-17—IX—1-37.

Wittmaack, K. Exact report of Siebenmann's opposition to my conclusions on the experiments on the conduction of sounds.

Beitr. z. Anat. Phys. Path. u. Therap. d. Ohres, Berlin, 1916—XVII—225-227.

Wotzilka, G. Contribution to the congenital anomalies of the ear.

Monatsch. f. Ohren., etc., Berlin, 1918—LII—588.

Wrightson, Sir T., and Keith, A. Demonstration on a new theory of hearing.

Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Otol. 80-94.

SECTION 7.—EXTERNAL NOSE.

Bailey, C. H. Serologic reactions in a case of rhinoscleroma.

J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—447.

Barber, H. W. Two cases of granulosis rubra nasi in boys.

Proc. Roy. Soc. Med., Lond., 1918-19—XII. Lect. Dermat., 40.

Beck, C. Reconstruction of nose after lupus.

Internat. Clin., Phila., 1919—III—64.

Carter, W. W. Correction of nasal deformities by the implantation of bone; improved technic.

Laryngoscope, St. Louis, 1919—XXIX—476.

Carter, W. W. Some observations on the correction of nasal deformities by physiologic methods.

Charlotte M. J., 1919—LXXX—13.

Hadden, W. E. Separation of tip of nose, with complete primary union.

Brit. M. J., Lond., 1919—II—466.

Ingersoll, J. M. Injuries of the nose and throat, due to bullet and shell wounds.

Laryngoscope, St. Louis, 1919—XXIX—624.

- Lorek, F.** Rhinoplasty for carcinoma of the nose.
Ann. Surg., Phila., 1919—LXIX—667.
- MacKee.** Rhinoscleroma.
J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—477.
- Neu, G. B.** Rhinophyma.
Laryngoscope, St. Louis, 1919—XXIX—391.
- Stuart-Low, W.** Dermoid fistula of the nose.
Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol., 102.

SECTION 8.—NASAL CAVITIES.

- Alonso, J. M., and Regules, E., Jr.** Congenital obstruction of posterior nares.
Rev. méd. del Uruguay, Montevideo, 1919—III—201.
- Bailey, C. H.** Serologic reactions in a case of rhinoscleroma.
J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—447.
- Beck, C.** Reconstruction of nose after lupus.
Internat. Clin., Phila.; 1919—III—64.
- Benians, T. H. C., and Hayton, C. H.** A method of treating atrophic rhinitis with ozena, based on an alteration in composition and reaction of the substrate on which the bacterial ferments are acting.
J. Laryngol., etc., London, 1919—XXXIV—325.
- Blickenstaff, A. J.** The submucous resection of the nasal septum.
Illinois M. J., Chicago, 1919—XXXIX—389.
- Brownlie, W. Barrie.** A case of infection of the lacrimal sacs, maxillary antra, pharynx, tonsils, mouth and parotid glands caused by blastomycis albicans (thrush organism).
J. Laryngol., etc., London, 1919—XXXIV—425.

- Carter, W. W.** Some observations on the correction of nasal deformities by physiologic methods.
Charlotte M. J., 1919—LXXX—13.
- Cavanaugh, J. A.** Submucous correction of the nasal septum.
Laryngoscope, St. Louis, 1919—XXIX—463.
- Dudley, W. H.** Parosmia.
Laryngoscope. St. Louis, 1919—XXIX—156.
- Garrison, J. E.** The middle turbinate.
J. Am. Ins. Homeop., 1919—XII—417.
- Glogau, O.** Nasal occlusion.
Laryngoscope, St. Louis, 1919—XXIX—177.
- Guthrie, D.** Choanal polypi in children: (1) Boy aged 9, and (2) a girl aged 12.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Laryngol., 153.
- Hastings, S.** Case showing method of repair of right side of nose.
Proc. Roy. Soc. Med., Lond., 1918-19—XII. Sec. Laryngol., 110.
- Heet, G. S.** Cases, casts, photographs and diagrams illustrating some methods of repair of wounds of the nasal cavities and nasal accessory sinuses.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sec. Laryngol., 115-117.
- Heet, G. S.** Epidiascopic demonstration of methods of treatment of gunshot wounds of the nose and nasal accessory sinuses.
Proc. Roy. Soc., Lond., 1918-19—XII. Sec. Laryngol., 135.
- Hitschler, W. A.** Technic of nasal douching.
Penn. M. J., Athens, 1918-19—XXII—551.
- Hofer, G.** Two cures of ozena by the Hofer and Kofler vaccines.
Monatsch. f. Ohrenh., Berlin, 1918—LII—104.

- Hooker, R. W.** Deviated septum.
Southern M. J., Birmingham, 1919—XII—574.
- Hurd, L. M.** Adenocarcinoma of the nose. Report of four cases.
Med. Her., St. Joseph, 1919—XXXVIII—151.
- Ingersoll, J. M.** Injuries of the nose and throat, due to bullet and shell wounds.
Laryngoscope, St. Louis, 1919—XXIX—624.
- Laessle, H. A.** Nasal and pharyngeal sequelae of influenza.
Laryngoscope, St. Louis, 1919—XXIX—103.
- Lautenschlaeger, A.** Operative experience in a progressive case of ozena.
Deutsch. med. Wchnschr., 1918—XLIV—1427.
- Lewi, W. G.** High frequency electricity in the treatment of rose cold and hay fever.
Albany M. Ann., 1919—XL—230.
- MacKee.** Rhinoscleroma.
J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—477.
- Monnier, E.** An elongated nasal tumor.
Med. klin., Berl., 1916—XI—811.
- Moore, Irwin.** Recurring sphenchoanal polypus in a child.
Proc. Roy. Soc., London, 1919—XII. Sect. Laryngol. 104.
- Newcomb, W. H.** Surgery of the nose in relation to influenza.
Internat. J. Surg., N. Y., 1919—32—XI—14.
- O'Malley, J. F.** Intranasal causes of colds in the head.
Clin. J., London, 1919—XLVIII—85.
- Peacock, C. N.** The importance of nasal breathing in prevention of dental caries.
Brit. Dent. J., London, 1919—XL—630.

- Pollock, H. L.** Nasal and sphenopalatine neurosis.
J. Am. M. Ass., Chicago, 1919—LXXIII—591.
- Schatz, H. A.** Ozena: experiences with vaccine preparation and use.
Laryngoscope, St. Louis, 1919—XXIX—17.
- Scheppegegrell, W.** The pollens in hay fever.
N. York M. J., 1919—CX—357.
- Scheppegegrell, W.** The treatment of hay fever.
Pub. Health Rep., Wash., 1919—XXXIV—1673.
- Sluder, G.** Asthma as a nasal reflex.
J. Am. M. Ass., Chicago, 1919—LXXIII—589.
- Spriggs, N. I., and Milliard, C. K.** Infective catarrhs; so-called colds.
Brit. M. J., London, 1919—II—153.
- Thompson, J. A.** Nasal hydrorrhea.
J. Am. M. Ass., Chicago, 1919—LXXII—587.
- Van Hoogenhuyze, C., and de Kleyn, A.** Two cases of ethmoiditis; case one tuberculous.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1917—CI—178-182.
- Wessels, A. B.** The pathogenesis of pachymeningitis due to nasal operations. With report of cases.
California State J. Med., San Francisco, 1919—XVII—383.
- Wolffheim, W.** Operation in nasopharyngeal fibroma.
Monatsch. f. Ohren., Berl., 1916—139.
- Worthington, R. A.** Foreign body removed from the nose after thirteen years.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Laryngol. 159.
- Wylie, A.** Sarcoma of the nose. Modified external operation (Moure's lateral rhinotomy).
Proc. Roy. Soc. Med., London, 1919—XII—162.

SECTION 9.—ACCESSORY SINUSES.

- Ballenger, H. C.** A study of 100 cases of suspected chronic nasal accessory sinus disease with a report of the X-ray findings.
Ill. Med. J., Chicago, 1919—XXXVI—316.
- Blackwell, H. B.** Report of two unusual cases of nasal sinus suppuration in relation to mastoidectomy.
N. York State J. M., N. Y., 1919—XIX—307.
- Brose, L. D.** Focal disease involving the maxillary antrum, the teeth and the eyes.
Laryngoscope, St. Louis, 1919—XXIX—583.
- Brownlie, W. Barrie.** A case of infection of the lacrimal sacs, maxillary antra, pharynx, tonsils, mouth and parotid glands caused by blastomycis albicans (thrush organism).
J. Laryngol., etc., London, 1919—XXXIV—425.
- Chiari, O.** Gunshot injuries of the frontal sinus.
Monatschr. f. Ohrenh., Berl., 1917—LI—601.
- Crowe, S. J., and Thacker-Neville, W. S.** Influenza bacillus in paranasal sinus infections.
Johns Hopkins Hosp. Bull., Baltimore, 1919—XXX—322.
- Davis, G. E.** The blood clot dressing in frontal sinus surgery.
Laryngoscope, St. Louis, 1919—XXIX—5.
- Frank, Ira.** A case of fulminating ethmoiditis with metastasis.
Laryngoscope, St. Louis, 1919—XXIX—425.
- Gongerot, H.** Posttraumatic epithelioma of the gum and maxillary sinus.
Rev. gen. de clin. et de therap., Par., 1919—XXXIII—178.
- Graef, C.** Rhinoplastic surgery.
N. York M. J., 1919—CX—56, 69.

- Hajek, M.** The diagnosis and therapeutics on uncomplicated polyposis of the antrum and ethmoid.
Med klin., Berl., 1916—XII—867, 869.
- Hall, G. C.** Case report. Knife blade removed from ethmoid, in position twenty-two years.
Kentucky M. J., Bowling Green, 1919—XVII—387, 89.
- Heet, G. S.** Cases, casts, photographs and diagrams illustrating some methods of repair of wounds of the nasal cavities and nasal accessory sinuses.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sec. Laryngol., 115-117.
- Heet, G. S.** Epidiascopic demonstration of methods of treatment of gunshot wounds of the nose and nasal accessory sinuses.
Proc. Roy. Soc., Lond., 1918-19—XII. Sec. Laryngol., 135.
- Heet, G. S.** Methods of repair of wounds of the nose and nasal accessory sinuses.
Proc. Roy. Soc. Med., Lond., 1918-19—XII. Sect. Laryngol., 136.
- Hoaglund, A. W.** Depressed fracture of frontal bone into the frontal sinus.
U. S. Nav. M. Bull., Wash., 1919—XIII—800.
- Hofer, G.** A treatise on the pathology of osteomyelitis of the frontal sinus.
Monatsch. f. Ohren., Berl., 1917—LI—639-644.
- Ingersoll, J. M.** Injuries of the nose and throat, due to bullet and shell wounds.
Laryngoscope, St. Louis, 1919—XXIX—624.
- Laessle, H. A.** Nasal and pharyngeal sequelae of influenza.
Laryngoscope, St. Louis, 1919—XXIX—103.
- Lang, W., and Armour, D.** Ivory exostosis growing from the roof of the frontal sinus into the orbital and cranial cavities, removed through an osteoplastic opening in the cranium by Mr. Donald Armour.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Ophth., 16.

- Marsh, H. S.** A case of vacuum frontal headache.
Med. J. Australia Sydney, 1919—I—462.
- Marsh, H. S.** Asthma due to chronic antral suppuration.
Med. J. Australia, Sydney, 1919—I—462.
- Marsh, H. S.** Tooth in antrum of Highmore.
M. J. Australia, Sydney, 1919—I—462.
- Mayer, O.** Implantation of periosteum and muscle flaps in antrum fistulae.
Monatsch. f. Ohrenh., Berl., 1917—LI—691.
- Mitchell, V. E.** Artificial restoration after the removal of portions of the maxilla or mandible.
Amer. J. Sur., N. Y., 1919—XXXIII—264.
- Moore, Irwin.** Recurring sphenchoanal polypus in a child.
Proc. Roy. Soc., London, 1919—XII. Sect. Laryngol. 104.
- Mullin, U. V.** The lymph drainage of the accessory nasal sinuses.
Laryngoscope, St. Louis, 1919—XXIX—606.
- Newcomb, W. H.** Surgery of the nose in relation to influenza.
Internat. J. Surg., N. Y., 1919-32—XI—14.
- O'Malley, John F.** Gunshot wounds of the nasal accessory sinuses.
J. Laryngol., London, 1919—XXXIV—333.
- Oppenheimer, S.** Accessory nasal sinuses of children.
J. A. M. Ass., Chicago, 1919—LXV—656.
- Sluder, G.** The diagnosis and prognosis of hyperthropic sphenoiditis.
Laryngoscope, St. Louis, 1919—XXIX—46.
- Terrier, P.** Radical treatment of frontal sinusitis.
Rev. méd. de la Suisse Romande, Gevena, 1919—IX—442.

- Van Hoogenhuyze, C., and de Kleyn, A.** Two cases of ethmoiditis; case one tuberculous.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1917—CI—178-182.
- Watson-Williams, P.** Latent sinusitis in relation to systemic infections, especially with reference to rheumatoid arthritis.
J. Laryngol., Lond., 1919—XXIV—233.
- Wessels, A. B.** The pathogenesis of pachymeningitis due to nasal operations. With report of cases.
California State J. Med., San Francisco, 1919—XVII—383.

**SECTION 10.—PHARYNX, INCLUDING TONSILS
AND ADENOIDS.**

- Acton, H. W.** Mycotic affections of the throat due to the endomyces tropicalis.
Indian M. J. Research, Calcutta, 1918-19—VI—591.
- Anderson, H. B.** Tonsillitis and pharyngitis as a result of oral sepsis.
Am. Med., Burlington, Vt., 1919—XIV—602.
- Appelyard, W.** A case of phlegmon of neck from a perforation of pharyngeal wall of a swallowed foreign body.
Lancet, Lond., 1919—II—164.
- Arrowsmith, H.** Foreign bodies in the air and upper food passages in preendoscopic days.
Laryngoscope, St. Louis, 1919—XXIX—633.
- Atkinson, E. L.** Influenza pneumococci in fauces.
J. Roy. Nav. M. Serv., Lond., 1919—V—325.
- Bane, W. C.** Sarcoma of the right tonsillar fossa.
Laryngoscope, St. Louis, 1919—XXIX—603.
- Baum, H. L.** A new instrument for tonsillectomy.
Laryngoscope, St. Louis, 1919—XXIX—96.
- Bird, U. S.** The uvula.
J. Florida M. Ass., Jacksonville, 1918—IV—331.

- Bowen, W. H.** Some practical consideration on the operation for removal of adenoids and enucleation of tonsils.
Brit. M. J., Lond., 1919—II—433.
- Boyle, H. E. G.** Case of laryngofissure with removal of intralaryngeal growth performed under gas and oxygen.
Proc. Roy. Soc. Med., Lond., 1918-19—XII—Sect. Anesth., 20.
- Britton, J. M.** Medical treatment of acute follicular tonsillitis.
Southwest. Med., El Paso, 1919-20—III—3.
- Brownlie, W. Barrie.** A case of infection of the lacrimal sacs, maxillary antra, pharynx, tonsils, mouth and parotid glands caused by blastomycis albicans (thrush organism).
J. Laryngol., etc., London, 1919—XXXIV—425.
- Bullowa, J. G. M.** Local evidence of tonsil involvement in the causation of distant or systemic disease.
Med. Clin. N. Am., Phila., 1919—XXIX—579.
- Chodak, H. H.** A case of palatal paralysis following influenza.
Brit. M. J., Lond., 1919—II—344.
- Clark, C. M.** An unusual malignant tumor of the pharynx.
Laryngoscope, St. Louis, 1919—XXIX—579.
- Cocker, A. B.** Treatment of acute septic gingivitis (Vincent's disease).
Brit. Dental J., Lond., 1919—XL—663.
- Coleman, J.** The use of apothesine anesthesia in tonsillectomy.
N. York M. J., 1919—CX—19.
- Courcoux and Lermoyez, J.** Prevalence of acute anginas.
Bull. soc. méd. d. hop., Paris, 1919—XXXXIII—794.
- Dawson, G. W.** Adherent palate.
Proc. Roy. Soc. Med., London, 1918-19—XII—150. Sec. Laryngol.

- Detling, F. E.** Treatment of the diphtheria carrier, with special reference to tonsillectomy and adenoidectomy.
Calif. State J. M., San F., 1919—XVII—295.
- Donelon, J.** Some suggested alternatives to operation for adenoids and enlarged tonsils in young children.
J. Laryngol., Lond., 1919—XXIV—229.
- Drew, D.** Child welfare and operation for tonsils and adenoids.
Brit. M. J., Lond., 1919—II—577.
- Faville, M. R.** A report of two cases of personal interest: a word in defense of the tonsils, and particularly as related to singing voice production.
Virginia M. Monthly, Richmond, 1919-20—XLVI—142.
- Fort, A. G.** Some remarks on the removal of tonsils.
J. Med. Ass. Georgia, Augusta, 1919-20—IX—34.
- Franke, K.** Endoscopy of the nasopharyngeal space.
Beitrag. z. Anat., Physiol., Pathol. and Therap. d. Ohres, Berl., 1916—VIII—284.
- Gatewood, L.** A simple, safe and rapid tonsil enucleation technic for local or general anesthesia.
Laryngoscope, St. Louis, 1919—XXIX—383.
- Gill, E. G.** Radical mastoid operation; indications.
Virginia M. Monthly, Richmond, 1919-20—XLVI—134.
- Glogau, O.** Adenoids in infants two months old.
Laryngoscope, St. Louis, 1919—XXIX—176.
- Grieves, C. J.** Ulceromembranous gingivitis: the gingival phase of Vincent's disease.
Dental Cosmos, Phil., 1919—II—156.
- Hansell, H. F.** Ocular affections dependent upon disease of the tonsils.
Tr. Am. Ophth. Soc., Phila., 1918—CLXI—87.
- Harkness, C. A.** Sludering tonsils under gas.
Clinique, Lond., 1920—XXXI—23.

- Harrison, H. M.** The unwarranted sacrifice of the tonsils, especially in children.
Illinois M. J., Chicago, 1919—XXXIV—14.
- Imhofer, R.** Treatise on postoperative complications after tonsillectomy.
Monatschr. f. Ohrenh., Berl., 1917—LI—633.
- Ingersoll, J. M.** Injuries of the nose and throat, due to bullet and shell wounds.
Laryngoscope, St. Louis, 1919—XXIX—624.
- Kelson, W. H.** Pharyngeal diverticula with notes of two cases; in one the pouch was removed under local, in the other under general anesthesia.
J. Laryngol., Lond., 1919—XXIX—444.
- Kiefer, H. A.** Vincent's angina.
Laryngoscope, St. Louis, 1919—XXIX—150.
- Laessle, H. A.** Nasal and pharyngeal sequelae of influenza.
Laryngoscope, St. Louis, 1919—XXIX—103.
- Lilienthal, H.** Resection of lungs for posttonsillectomy abscess.
Surg., Gynec. & Obstet., Chicago, 1919—XXIX—443.
- MacDonald, Peter.** A method of enucleating tonsils which lessens bleeding.
Brit. M. J., London, 1919—437.
- Moore, Irwin.** The treatment of enlarged or diseased tonsils in cases where surgical procedures are contra-indicated.
J. Laryngol., Lond., 1919—XXIV—387.
- Mosher, H. P.** Thrombosis of the internal jugular vein with pyema as a complication of retropharyngeal abscess.
Laryngoscope, St. Louis, 1919—XXIX—638.
- Mudd, S., and Grant, S. B.** An experimental study of a possible mechanism for the excitation of infections of the pharynx and tonsils.
Am. J. Physiol., Balt., 1919—20—XLIX—144.

- Parkes, W. R.** Control of hemorrhage in tonsillectomies.
Surg., Gyn. and Obstet., Chicago, 1919—XXIX—515.
- Potts, J. B.** Management of mastoids in army hospitals.
Nebraska M. J., Norfolk, 1919—IV—269.
- Rethi, A.** Therapeutics of adhesions between soft palate and pharynx.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1917—XLVII—53.
- Richey, De W. G.** Experimental streptococcic tonsillitis: the apparent inefficiency of streptococcic vaccine as prophylacti.
J. Infect. Dis., Chicago, 1919—XXV—299.
- Robnett, A. H.** Ideal tonsil operation.
U. S. Nav. M. Bull., Wash., 1919—XIII—806.
- Schlemmer, F.** Tonsillectomy and its possible complications.
Monatsch. f. Ohren., Berlin, 1916—I—513-521.
- Scott, G. D.** Adenoids, chronic conjunctivitis, photophobia case and a cure.
N. York State J. Med., 1919—XIX—374.
- Semple, Sir David, Price-Jones, Cecil and Dight, Miss L.**
A report for the pathologic committee of the War Office of an inquiry into gingivitis and Vincent's disease occurring in the army.
Royal Army Med. Corps, Lond., 1919—XXIII—281.
- Shipway, F. E.** Case of tonsillectomy in a man weighing twenty-three stone.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Anesth., 18-20.
- Symonds, Sir C. J.** Removal of tonsils and adenoids.
Brit. M. J., London, 1919—II—558.
- Winchell, A. I., and Stelman, E. G.** Occurrence of bacillus influenza in normal throat.
J. Exp. M., Baltimore, 1919—XXX—497.

- Wolffheim, W.** Operation in nasopharyngeal fibroma.
Monatsch. f. Ohren., Berl., 1916—139.
- Wylie, A.** Endothelioma of left tonsil. Operation performed.
Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol. 101.

SECTION 11.—LARYNX.

- Arrowsmith, H.** Foreign bodies in the air and upper food passages in preendoscopic days.
Laryngoscope, St. Louis, 1919—XXIX—633.
- Freudenthal, W.** Two cases of subglottic tumors.
Laryngoscope, St. Louis, 1919—XXIX—383.
- Grant, J. B.** Case of polypus of the larynx removed with snare.
Proc. Roy. Soc. Med., Lond., 1919—XII. Sect. Laryngol., 165.
- Guisez.** Minor signs of so-called latent foreign bodies in the esophagus.
Paris méd., 1919—XXXVI—196.
- Hemmeon, J. A. M.** Ulceromembranous laryngitis of streptococcic origin.
Brit. M. J., Lond., 1919—I—604.
- Ingersoll, J. M.** Injuries of the nose and throat, due to bullet and shell wounds.
Laryngoscope, St. Louis, 1919—XXIX—624.
- Jackson, C.** Treatment of laryngeal stenosis by corking the tracheotomic cannula.
Laryngoscope, St. Louis, 1919—XXIX—1.
- Jewell, W. H.** Case of infiltration and ulceration of the vocal cords.
Proc. Roy. Soc. Med. Lond., 1919—XII. Sect. Laryngol., 113.

- Macleod, A. L.** Microscopic specimens and report of a case of adenoma of the vocal cord, removed by thyro-fissure.
Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol., 148.
- Nadoleczny, M.** Hemorrhage of vocal cords through overstrain by singing and false breathing.
Beit. z. Anat., Physiol., Pathol., Therap. d. Ohres, Berl., 1916—VIII—304-317.
- Onodi, A.** A case of central fixation of the left vocal cord; stenosis of trachea; aneurism of aorta; perforation of bronchus.
Arch. f. Ohren., Nasen and Kehpkopf, Leipzig, 1917—LIV—56.
- Rice, G. S.** Tuberculosis of the larynx.
J. Am. Inst. Homeop., Chicago, 1919-20—XII—55.
- Stickney, O.** Report of two cases of abducens paralysis occurring in acute suppurative otitis media with mastoiditis.
Laryngoscope, St. Louis, 1919—XXIX—395.
- Stuart-Low, A.** Epithelioma of the epiglottis.
Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol., 104.
- Syme, W. S.** Removal of the larynx for malignant disease.
Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol., 109.
- Tuley, H. E.** Fatal laryngeal edema following influenza.
Kentucky M. J., Bowling Green, 1919—XVII—315.
- Van Hoogenhuyze, C., and de Kleyn, A.** Laryngitis ulceromembranacea (Plant-Vincent) with woody phlegmon.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1917—CI—182-184.

Worthington, R. A. A case of epithelioma of the epiglottis treated by deathering.

Proc. Roy. Soc. Med., Lond., 1919—XII. Sect. Laryngol. 158.

Wylie, A. Bilateral ankylosis of the vocal cords. Case for diagnosis.

Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol. 160.

Wylie, A., and Ryland, A. Chronic unilateral laryngitis for diagnosis.

Proc. Roy. Soc. Med., London, 1919—XII. Sect. Laryngol. 164.

SECTION 12.—TRACHEA AND BRONCHI.

Arrowsmith, H. Foreign bodies in the air and upper food passages in preendoscopic days.

Laryngoscope, St. Louis, 1919—XXIX—633.

Cooper, P. R. Tranquil tracheotomy.

Brit. M. J., Lond., 1919—II—545.

Craglietto, Virgilio. Bean in infant's bronchus.

Revista di clin. pediat., Florence, 1919—XVII—477.

Guthrie, D. A method of tracheotomy without loss of blood.

Surg. Gyn. and Obstet., Chgo., 1919—XXIX—316.

Ingersoll, J. M. Injuries of the nose and throat, due to bullet and shell wounds.

Laryngoscope, St. Louis, 1919—XXIX—624.

Le Marchand, A. W. Long retained foreign body in the bronchus.

Lancet, London, 1919—II—646.

Meurisse, P. Tuberculous membranous cast of the bronchus.

Progrès méd., Paris, 1919—XXXIV—354.

Moore, Irwin. Foreign bodies in the esophagus and respiratory passages.

Lancet, Lond., 1919—II—556.

- Murphy, J. W.** Report of removal of foreign bodies from the bronchi and esophagus.
Laryngoscope, St. Louis, 1919—XXIX—106.
- Onodi, A.** A case of central fixation of the left vocal cord; stenosis of trachea; aneurism of aorta; perforation of bronchus.
Arch. f. Ohren., Nasen and Kehlkopf, Leipzig, 1917—LIV—56.
- Thomson, Sir St. Clair.** Tranquil tracheotomy by injecting cocain within the windpipe.
Brit. M. J., London, 1919—461.
- Vargas, M.** Comparison between tracheotomy and intubation.
Rev. espan. d. méd. y. cir., Barcelona, 1919—XIV—427.
- Williams, W. R.** Chronic bronchitis with emphysema and asthma.
Homeopathic Med. Sc., Phila., 1919—LIV—612.

SECTION 13.—VOICE AND SPEECH.

- Blanton, M. G., and Blanton, S.** What is the problem of stuttering?
J. Abnormal Psychol., Bost., 1919—XIII—303.
- Creasy, Hannah M.** Psychopathology of speech defects.
Quart. J. Speech Educ., Menosha, Wis., 1919—V—266.
- Faville, M. R.** A report of two cases of personal interest: a word in defense of the tonsils, and particularly as related to singing voice production.
Virginia M. Monthly, Richmond, 1919—20—XLVI—142.
- Froeschels, E.** Differential diagnosis between recent and old standing trauma in stammering.
Med. Klin., Berl., 1916—XII—694, 696.
- Gaylord, J. S.** Speech improvement.
Quart. J. Speech Educ., Menosha, Wis., 1919—V—358.
- Karss.** The treatment of hysterical loss of voice (aphonia).
Med. klin., Berl., 1916—XII—953.

- Kinzie, R.** The speech-reading club of Philadelphia.
Volta Rev., Wash., 1919—XXI—463.
- Kenyon, E. L.** Stammering as a disorder of speech dependent on conditions of child development.
Am. J. Dis. Child., 537.
- Kenyon, E. L.** The nature and origin of stammering.
Laryngoscope, St. Louis, 1919—XXIX—639.
- Kessler, E. B.** The aurist and lip reading.
Laryngoscope, St. Louis, 1919—XXIX—163.
- Kinzie, R.** The speech-reading club of Philadelphia.
Volta Review, Wash., 1919—XXI—463.
- Lorenson, H.** Some remarks on aphasia.
Am. Med., Burlington, Vt., 1919—XXV—715.
- Marage.** The quality of the voice of deafmutes.
Compt. rend. acad. d. sc., Par., 1919—CLXVIII—286.
- Martin, F.** Stammering.
Quart. J. Speech Educ., Menosha, Wis., 1919—V—287.
- McKenzie, L. B.** Stimulating the language centers through auditory channels.
Volta Rev., Washington, 1919—XXI—725.
- Merry, G. N.** A roentgenologic method of measuring the potentiality of the voice resonance.
Quart. J. Speech Educ., Menosha, Wis., 1919—XXVI.
- Mitain, G., and Schuhmann, E.** Disturbances of speech in cerebellar disease.
Paris méd., 1919—XLIII—321.
- Nadoleczny, M.** Hemorrhage of vocal cords through overstrain by singing and false breathing.
Beitr. z. Anat., Physiol., Pathol., Therap. d. Ohres, Berl., 1916—VIII—304-317.
- Rothe, K. C.** The philosophic and psychologic influence on stammering.
Zeitsch. f. d. Neurol. & Psychiat., Berlin, 1917—XXXVI—54.

- Sporry, R.** About the health and developmental value of proper singing.
Monatsch. f. Kinder., Leipz. & Wien, 1917—XIV—303.
- Swift, W. B.** How to begin speech correction in public schools.
Quart. J. Speech Educ., Menosha, Wis., 1919—239.
- Swift, W. B.** The speech movement in America.
Jour. Lancet, Minn., 1919—XXXIX—435.
- Tompkins, E.** Stammering and modern medicine.
Mod. Hospital, Chicago, 1919—I—No. 5, 448.
- Tompkins, E.** Left handedness and stammering problem.
Quart. J. Speech Educ., Menosha, Wis., 1919—VI—11.
- Upham, E. G.** Retraining the deaf.
Mod. Hosp., St. Louis, 1919—XIII—359.

SECTION 14.—ESOPHAGUS.

- Appelyard, W.** A case of phlegmon of neck from a perforation of pharyngeal wall of a swallowed foreign body.
Lancet, Lond., 1919—II—164.
- Arrowsmith, H.** Foreign bodies in the air and upper food passages in preendoscopic days.
Laryngoscope, St. Louis, 1919—XXIX—633.
- Blaine, E. S.** The X-ray examination of the normal and pathologic esophagus.
Internat. Clin., Phila., 1919—III—144.
- Chauffard.** Cancer of the esophagus.
Rev. gen. de clin. et de therap., Par., 1919—XXXIII—386.
- Devic and Bouchut, L.** Atony of the esophagus.
Lyon chir., 1919—XVI—225.
- Freeman, E. B.** Esophagoscopy as an aid in the diagnosis and treatment of esophageal disease.
Med. Clin. N. Am., Phila., 1919—II—1691.

- Guisez.** Reconstruction of the esophagus.
Presse méd., Paris, 1919—XXVII—575.
- McNaught, H. Y.** Paralysis of the esophagus.
Calif. State J. M., San F., 1919—XVII—376.
- Moore, Irwin.** Foreign bodies in the esophagus and respiratory passages.
Lancet, Lond., 1919—II—556.
- Murphy, J. W.** Report of removal of foreign bodies from the bronchi and esophagus.
Laryngoscope, St. Louis, 1919—XXIX—106.
- Paterson, D. R.** A clinical type of dysphagia.
J. Laryngol., Lond., 1919—XXIV—289.
- Peredo, P. P.** Spastic stenosis of the esophagus.
Gac. méd. de Mexico, 1919—III—170.
- Smithies, F.** Diagnosis and clinical manifestations of cardiospasm associated with diffuse dilatation of the esophagus.
J. Roentgenol., Iowa City, 1919—II—94.

SECTION 15.—ENDOSCOPY.

- Arrowsmith, H.** Foreign bodies in the air and upper food passages in preendoscopic days.
Laryngoscope, St. Louis, 1919—XXIX—633.
- Craglietto, Virgilio.** Bean in infant's bronchus.
Revista di clin. pediat., Florence, 1919—XVII—477.
- Franke, K.** Endoscopy of the nasopharyngeal space.
Beitrag. z. Anat., Physiol., Pathol. and Therap. des Ohres, Berl., 1916—VIII—284.
- Freeman, E. B.** Esophagoscopy as an aid in the diagnosis and treatment of esophageal disease.
Med. Clin. N. Am., Phila., 1919—II—1691.
- Moore, Irwin.** Foreign bodies in the esophagus and respiratory passages.
Lancet, Lond., 1919—II—556.

- Murphy, J. W.** Report of removal of foreign bodies from the bronchi and esophagus.
Laryngoscope, St. Louis, 1919—XXIX—106.

SECTION 16.—EXTERNAL EAR AND CANAL.

- Alexander, G., and Urbantschitsch, E.** War injuries and war diseases of the ear.
Monatsch. f. Ohren., etc., Berlin, 1916—I—241, 570, 609;
1917, 51, 505; 1918, 52, 476.

- Blackwell, H. B.** Furunculosis of external auditory canal.
Med. Rec., New York, 1919—XCVI—543.

- Cutler, F. E.** Injuries to the auditory canal resulting from projectiles, with special reference to the separation of the cartilaginous from the bony canal.
Laryngoscope, St. Louis, 1919—XXIX—82.

- Dean, L. W., and Armstrong, Margaret.** A case of fibrosis of tissues lining the external auditory canal and tissues overlying the mastoid.
Laryngoscope, St. Louis, 1919—XXIX—365.

- Haymann, L.** Gunshot wounds of the ear.
Internat. Centralbl. f. Ohren., etc., Leipzig, 1918—XVI—33.

- Heger.** Test of the acoustic function and space.
Beitr. z. Anat., Physiol., Path. u. Therap. des Ohres, etc., Berlin, 1916—IX—174.

- Karrenstein.** Injuries of the hearing apparatus in war.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres, Berl., 1916—VIII—271.

- Maldonado, Morono, S. F., and Widakovich, V.** Congenital atresia of the ear.
Semana méd., Buenos Aires, 1918—XXV—128.

- Onodi, L.** Congenital fistulæ of the ear.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipzig, 1918—CII—128.

Parownagian. Epithelioma of the ear.

J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—497.

Ruttin, E. Partial traumatic separation of the external auditory canal.

Beit. z. Anat., Physiol., Path. u. Therap. d. Ohres., etc., Berlin, 1919—XI—227.

Stuart-Low. A female with fibroma of the auricle at the entrance of the meatus.

Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Otol., 79.

Stuart-Low, W. Epithelioma of the left auricle after operation (specimen of ear removed shown).

Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Otol. 78.

Wotzilka, G. Contribution to the congenital anomalies of the ear.

Monatsch. f. Ohrenh., etc., Berlin, 1918—LII—588.

SECTION 17.—MIDDLE EAR, INCLUDING TYMPANIC MEMBRANE AND EUSTACHIAN TUBE.

Alexander, G., and Urbantschitsch, E. War injuries and war diseases of the ear.

Monatsch. f. Ohrenh., etc., Berlin, 1916—I—241, 570, 609; 1917, 51, 505; 1918, 52, 476.

Allis, E. P. On the homologies of the auditory ossicles and the chorda tympani.

J. Anat., Lond., 1918-19—LIII—363.

Beck, O. Otitis following diving, sinus thrombosis, island formation of internal jugular.

Monatsch. f. Ohrenh., etc., 1919—LIII—39.

Blue, J. B. Labyrinthitis accompanying acute purulent otitis media.

J. Tenn. M. Ass., Nashville, 1919-20—XII—48, 50.

- Cemach, A. I.** The specific treatment of middle ear tuberculosis.
Monatsch. f. Ohrenh., Berl., 1916—I—430.
- Cursehmann, H.** Diagnosis and treatment of Meniere's symptom complex.
Therap. Monatsch., Berlin, 1919—XXXIII—9.
- Dieckman.** The traumatic rupture of the ear drum in the field.
Med. Klin., Berl., 1916—XII—635.
- Frazer, N. E.** Chronic purulent otitis media.
J. Arkansas Med. Soc., Little Rock, 1919—XVI—139.
- Fraser, J. S., and Garretson, W. T.** Part I (Continued).
The complications of chronic middle ear suppuration. Indications for, technic and results of the radical and modified radical mastoid operations; details regarding the labyrinthine and intracranial complications of chronic middle ear suppuration.
J. Laryngol., etc., London, 1919—XXXIV—373, 432.
- Guthrie, D.** Aural suppuration in early childhood; its prevention and treatment.
Lancet, Lond., 1919—II—429.
- Guttmann, J.** Report of a case of an otitic abscess of the brain.
Laryngoscope, St. Louis, 1919—XXIX—581.
- Haymann, L.** Gunshot wounds of the ear.
Internat. Centralbl. f. Ohren., etc., Leipzig, 1918—XVI—33.
- Hecht.** Chronic suppurative otitis media with cholesteatoma and marked fistula, from a military standpoint.
München med. Wchnschr., 1916—LXIII—956.
- Hill, F. T.** A study of the aural complications of the recent influenza epidemic with special reference to the clinical picture.
Laryngoscope, St. Louis, 1919—XXIX—351.

- Hoffman, R.** Ear injuries from gun explosion.
Deutsch. med. Wchnschr., Leipzig and Berl., 1916—
XLII—998.
- Holmgren, G.** The aural complications of Spanish influenza.
Förh. Svens. Läk-Sälisk. Sammank, 1918—694.
- Holmgren, G.** Radium therapy in tubal stenosis.
Laryngoscope, St. Louis, 1919—XXIX—590.
- Imhofer, R.** The dry perforation of the tympanic membrane in reference to military insurance
Ztsch. f. Laryngol., Rhinol., etc., Würtzb., 1916-17—
VIII—579.
- Imhofer, R.** Therapy of the traumatic rupture of the tympanic membrane.
Therap. Monatschr., Berlin, 1918—XXXII—454.
- Jones, J. A.** A case of acute septic meningitis of otitic origin; complete recovery.
Lancet, Lond., 1919—II—59.
- Kahn, A.** Two new instruments for reaching the upper end of the eustachian tube in the radical mastoid operation.
Laryngoscope, St. Louis, 1919—XXIX—143.
- Karrenstein.** Injuries of the hearing apparatus in war.
Beitr. z. Anat., Physiol., Path. u. Therap. Ohres, Berl., 1916—VIII—271.
- Kernan, J. D.** Bone conduction in certain cetacea and its relation to increased bone conduction in human beings.
Laryngoscope, St. Louis, 1919—XXIX—614.
- Lanier, L. H.** The importance of early treatment of chronic hypertrophic otitis media. Report of a case.
Med. Fortnightly, St. Joseph, 1919—I—I—143.
- Lehmann.** Local anesthesia in operations on the middle ear.
Zentralbl. f. Chir., Leipz., 1918—XLV—367,369.

- Lewy, Alfred.** The operative treatment of chronic suppurative otitis media.
Illinois M. J., Chicago, 1919—XXXVI—185.
- Onodi, L.** Congenital fistulae of the ear.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipzig, 1918—CII—128.
- Oppenheimer, S.** Otitic sinus thrombosis.
Laryngoscope, St. Louis, 1919—XXIX—172.
- Pratt, J. A.** Treatment study of otosclerosis.
Minnesota Med., St. Paul, 1919—II—390.
- Ridout, C. A. S.** Efficient treatment of the chronic running ear.
Brit. M. J., London, 1919—II—154.
- Rott, O. M.** The clinical interpretation of labyrinthine phenomena in the presence of suppurative inflammation of the middle ear.
Northwest. Med., Seattle, 1918—XVII—56.
- Sibbald, D. W.** Bezold's mastoiditis without history of aural suppuration.
Brit. M. J., London, 1919—II—441.
- Siebenmann, F.** Answer to Wittmaack's remarks concerning experimental injuries due to excessive sounds, etc.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres, etc., Berlin, 1916-17—IX—38.
- Smith, A. E.** Gradenigo's syndrome as a late complication following mastoidectomy. Report of a case.
Minnesota Med., St. Paul, 1919—II—424.
- Stickney, O.** Report of two cases of abducens paralysis occurring in acute suppurative otitis media with mastoiditis.
Laryngoscope, St. Louis, 1919—XXIX—395.
- ment of chronic suppurative otitis media.
- Stoker, F.** The use of bismuth and iodoform in the treatment.
Lancet, London, 1919—II—200.

- Ulrich, K.** An unusual failure in diagnoses of an ear case.
Arch. f. Ohren., Nasen, Kehlkopf, Leipzig, 1918—CIII—16.
- Wells, G. S.** Case of leptomeningitis of otitic origin.
California State J. M., San Francisco, 1919—XVII—398.
- Wittmaack, K.** Tympanic membrane and pneumatization.
Beitrag. z. Anat. Phys. Pathol. u. Therap. d. Ohres, etc., Berlin, 1916-17—115.

SECTION 18.—MASTOID PROCESS.

- Alexander, G., and Urbantschitsch, E.** War injuries and war diseases of the ear.
Monatsch. f. Ohren., etc., Berl., 1916—I—241, 570, 609;
1917, 51, 505; 1918, 52, 476.
- Blackwell, H. B.** Perisinus and epidural mastoid abscess subsequent to influenza.
Laryngoscope, St. Louis, 1919—XXIX—587.
- Blackwell, H. B.** Report of two unusual cases of nasal sinus suppuration in relation to mastoidectomy.
N. York State J. M., N. Y., 1919—XIX—307.
- Borries, G. V. T.** Death rate in mastoid operations.
Monatsch. f. Ohren., Berl., 1917—I—675.
- Clark, J. Sheldon.** Immediate closure in selected cases of acute mastoiditis.
Illinois M. J., Chicago, 1919—XXXVI—249.
- Dean, L. W., and Armstrong, Margaret.** A case of fibrosis of tissues lining the external auditory canal and tissues overlying the mastoid.
Laryngoscope, St. Louis, 1919—XXIX—365.
- Dighton, A.** Mastoiditis.
Brit. M. J., Lond., 1919—II—40.

- Fraser, J. S., and Garretson, W. T.** Part I (Continued).
The complications of chronic middle ear suppuration. Indications for, technic and results of the radical and modified radical mastoid operations; details regarding the labyrinthine and intracranial complications of chronic middle ear suppuration.
J. Laryngol., etc., London, 1919—XXXIV—373, 432.
- Goldstein, M. A.** Local anesthesia and the mastoid operation.
Laryngoscope, St. Louis, 1919—XXIX—559.
- Haymann, L.** Gunshot wounds of the ear.
Internat. Centralbl. f. Ohren., etc., Leipzig, 1918—XVI—33.
- Hays, H. M.** X-ray diagnosis of a case of acute mastoiditis with no mastoid symptoms.
Laryngoscope, St. Louis, 1919—XXIX—660.
- Hill, F. T.** A study of the aural complications of the recent influenza epidemic with special reference to the clinical picture.
Laryngoscope, St. Louis, 1919—XXIX—351.
- Jones, W. D.** Report of two cases of acute mastoiditis with perisinus and epidural abscess.
Pacific Coast J. Nurs., San Fran., 1919—XV—189.
- Kahn, A.** Two new instruments for reaching the upper end of the eustachian tube in the radical mastoid operation.
Laryngoscope, St. Louis, 1919—XXIX—143.
- Karrenstein.** Injuries of the hearing apparatus in war.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres, Berl., 1916—VIII—271.
- Knight, F. H.** Anomalous condition found secondary to mastoidectomy.
Laryngoscope, St. Louis, 1919—XXIX—432.
- Lewis, E. C.** Chloroma simulating mastoid disease.
Lancet, London, 1919—II—830.

- Lillie, H. I., and Barlow, R. A.** Operation for acute and subacute mastoiditis. Results in a series of sixty-five cases.
Jour. Lancet, Minneap., 1919—XXXIX—573
- Neuhof, H., and Cocks, G. H.** Remarks upon the treatment of gunshot wounds of the mastoid.
Laryngoscope, St. Louis, 1919—XXIX—615.
- Onate, A. Frias.** Eye sign in mastoiditis.
Vida nueva, Havana, 1919—XI—172.
- Pfingst, A. O.** Indications for the simple and radical mastoid operation.
Internat. J. Surg., N. Y., 1919—XXXI—359.
- Potts, J. B.** Mastoidectomy: postoperative treatment by use of surgical solution of chlorinated soda and modification necessary to secure the best results.
J. Am. M. Ass., Chicago, 1919—LXXIII—605.
- Sibbald, D. W.** Bezold's mastoiditis without history of aural suppuration.
Brit. M. J., London, 1919—II—441.
- Simpson, W. L.** An unusual mastoid case.
J. Tenn. M. Ass., Nashville, 1917-20—XII—56.
- Stickney, O.** Report of two cases of abducens paralysis occurring in acute suppurative otitis media with mastoiditis.
Laryngoscope, St. Louis, 1919—XXIX—395.

SECTION 19.—INTERNAL EAR.

- Alexander, G., and Urbantschitsch, E.** War injuries and war diseases of the ear.
Monatsch. f. Ohren., etc., Berl., 1916—I—241, 570, 609;
1917, 51, 505; 1918, 52, 476.
- Beaudoux, H. A.** The relation of labyrinth disturbances to general symptomatology.
Minnesota Med., St. Paul, 1919—II—22, 27.

- Blue, J. B.** Labyrinthitis accompanying acute purulent otitis media.
J. Tenn. M. Ass., Nashville, 1919-20—XII—48, 50.
- Curschmann, H.** Diagnosis and treatment of Meniere's symptom complex.
Therap. Monatsch., Berlin, 1919—XXXIII—9.
- Fleischmann, O.** The origin of the fluid in the labyrinth.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipzig, 1918—CII—193.
- Fraser, J. S., and Garretson, W. T.** Part I (Continued).
The complications of chronic middle ear suppuration. Indications for, technic and results of the radical and modified radical mastoid operations; details regarding the labyrinthine and intracranial complications of chronic middle ear suppuration.
J. Laryngol., etc., London, 1919—XXXIV—373, 432.
- Gatscher, S.** The independence of the nervus cochlearis and vestibularis.
Monatschr. f. ohrenh., Berl., 1917—II—665, 674.
- Goebel, O.** The value of the psychogalvanic reflex.
Arch. f. Ohren., Nasen u. Kehlkopf, Leipzig, 1918—CII—183.
- Guettich, A.** The relation of temperature sensitiveness of the skin with the vestibular apparatus.
Beit. z. Anat., Physiol., Path., Therap. d. Ohres, Berl., 1916-17—IX—113.
- Haymann, L.** Gunshot wounds of the ear.
Internat. Centralbl. f. Ohren., etc., Leipzig, 1918—XVI—33.
- Hoffman, R.** Ear injuries from gun explosion.
Deutsch. med. Wchnschr., Leipzig and Berl., 1916—XLII—998.
- Ivy, A. C.** Experimental studies on the brain stem. II. Comparative study of the relation of the cerebral cortex to vestibular nystagmus.
J. Comp. Neurol., Phila., 1919—XXX—1.

- Karrenstein.** Injuries of the hearing apparatus in war.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres,
Berl., 1916—VIII—271.
- Knode, A. B.** Aural vertigo.
Nebraska M. J., Norfolk, Neb., 1919—IV—82.
- Lake, R.** Particulars of a case of vertigo. Labyrinthotomy,
obliteration of the semicircular canals and part of
cochlea by bone.
Proc. Roy. Soc. Med., Lond., 1918-19—XII—101.
- Leprince, A.** Pseudo-Meniere's disease.
Med. Rec., N. Y., 1919—XCVI—496.
- O'Malley, J. F.** Vertigo, labyrinthine or cerebellar.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect.
Otol., 79.
- Richter, A.** Nerve deafness following explosions.
Jahresb. f. Psychiat. u. Neurol., Leipzig & Wien, 1918
—XXXVIII—373.
- Ruttin, E.** Labyrinthial fistula.
Monatschr. f. Ohres, Berlin, 1915—XLIX—457-495.
- Siebenmann, F.** Answer to Wittmaack's remarks concern-
ing experimental injuries due to excessive sounds,
etc.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres, etc.,
Berlin, 1916-17—IX—38.
- Smith, A. E.** Gradenigo's syndrome as a late complication
following mastoidectomy. Report of a case.
Minnesota Med., St. Paul, 1919—II—424.
- Ulrich, K.** An unusual failure in diagnoses of an ear case.
Arch. f. Ohren., Nasen, Kehlkopf, Leipzig, 1918—CIII
—16.
- Winkler, C.** Innervation of the semicircular canals in the
labyrinth of the new born rat.
Arch. neerl d. physiol., La Haye, 1917-18—XI—556.

Wittmaack, K. Pathologic anatomy and pathophysiology of points of nonsuppurative disease of the inner ear and of the auditory nerve.

Arch. f. Ohren., Nasen u. Kehlkopf, Leipz., 1916—XCIX—71.

Wrightson, Sir T. The internal ear.

Science Prog. 20th cent., London, 1919-20—XIV—106.

**SECTION 20.—DEAFNESS AND DEAFMUTISM,
AND TESTS FOR HEARING.**

Blumenthal, A. Determination of bone conduction in gunshot wounds of the head.

Monatschr. f. Ohren., etc., Berlin, 1917—LI—270.

Bröss, R. The influence of the intensity of tones and interpretation of tones by deafmutes.

Beit. z. Anat. Physiol., Path. Therap. d. Ohres, Berl., 1916-17—LVIII.

Carpenter, E. R. Central deafness.

Laryngoscope, St. Louis, 1919—XXIX—25.

Castex, A. Peculiarities of deafness in musicians.

Paris méd., 1919—XXXVI—192.

Erd, R. L. Military drill in schools for the deaf.

Am. Ann. Deaf., Wash., 1919—LXIV—379.

Fusfeld, I. S. The deaf in the thirteenth census of the United States.

Am. Ann. Deaf., Wash., 1919—XLVI—262.

Gallahan, J. F. Consensual reaction in the hearing centers.

Laryngoscope, St. Louis, 1919—XXIX—569.

Gatscher, S. Modification of Gelle's test by way of the eustachian tube through the catheter.

Monatschr. f. Ohrenh., etc., Berlin, 1917—I—297.

Gemmill, W. H. The state: its relations and obligations to the deaf child.

Am. Ann. Deaf, Wash., 1919—XLVI—289.

- Goebel, O.** The value of the psychogalvanic reflex.
Arch. f. Ohren., Nasen u. Kehlkopf. Leipzig, 1918—
CII—183.
- Heger.** Test of the acoustic function and space.
Beitr. z. Anat., Physiol., Path. u. Therap. des Ohres,
etc., Berlin, 1916-17—IX—174.
- Kernan, J. D.** Bone conduction in certain cetacea and its
relation to increased bone conduction in human
beings.
Laryngoscope, St. Louis, 1919—XXIX—614.
- Ogden, R. M.** Hearing.
Psychol. Bull., Princeton, N. J., and Lancaster, Pa.,
1919—XVI—142.
- Schaefer, K. L.** The value of Seebecker's resonance tube
for determination of the higher tone limits.
Beitr. z. Anat., Physiol., Path. u. Therap. d. Ohres, etc.,
Berlin, 1916—VIII—327.
- Seashore, C. E.** The Iona pitch range auditory meter.
Jour. Lancet, Minneap., 1919—XXXIX—545.
- Stein, O. J.** Three reflex signs useful in examining the ear
for deafness.
Laryngoscope, St. Louis, 1919—XXIX—659.
- Upham, E. G.** Retraining the deaf.
Mod. Hosp., St. Louis, 1919—XIII—359.
- Urbantschitsch, E.** Improvements in ear trumpets.
Monatschr. f. Ohrenh., Berl., 1917—LI—682-685.
- Wittmaack, K.** Comparative examinations of sounds by air
conduction in swinging apparatus.
Arch. f. Ohrenh., Nasen u. Kehlkopf, Leipzig, 1918—
CII—96-107. Also,
Beitrag. z. Anat. Physiol. Path. u. Therap. des Ohres,
etc., Berlin, 1916-17—IX—1-37.

Wittmaack, K. Exact report of Siebenmann's opposition to my conclusions on the experiments on the conduction of sounds.

Beitr. z. Anat., Phys., Path. u. Therap. d. Ohres, Berl., 1916—XVII—225-227.

Wodak, E. The use of Barany's apparatus to diagnose malingers by action of the lids.

Monatsch. f. Ohren, etc., Berlin, 1919—LIII—23.

SECTION 21.—FOREIGN BODIES IN THE NOSE, THROAT AND EAR.

Appelyard, W. A case of phlegmon of neck from a perforation of pharyngeal wall of a swallowed foreign body.

Lancet, Lond., 1919—II—164.

Arrowsmith, H. Foreign bodies in the air and upper food passages in preendoscopic days.

Laryngoscope, St. Louis, 1919—XXIX—633.

Craglietto, Virgilio. Bean in infant's bronchus.

Revista di clin. pediat., Florence, 1919—XVII—477.

Guisez. Minor signs of so-called latent foreign bodies in the esophagus.

Paris méd., 1919—XXXVI—196.

Hall, G. C. Case report. Knife blade removed from ethmoid, in position twenty-two years.

Kentucky M. J., Bowling Green, 1919—XVII—387, 89.

Law, F. M. Foreign bodies in the face.

Am. Atlas Stereoroentgenol., Troy, N. Y., 1917-18—II—206.

Le Marchand, A. W. Long retained foreign body in the bronchus.

Lancet, London, 1919—II—646.

Moore, Irwin. Foreign bodies in the esophagus and respiratory passages.

Lancet, Lond., 1919—II—556.

Murphy, J. W. Report of removal of foreign bodies from the bronchi and esophagus.

Laryngoscope, St. Louis, 1919—XXIX—106.

Worthington, R. A. Foreign body removed from the nose after thirteen years.

Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Laryngol. 159.

**SECTION 22.—ORAL CAVITY, INCLUDING
TONGUE, PALATE AND INFERIOR
MAXILLARY.**

Anderson, H. B. Tonsillitis and pharyngitis as a result of oral sepsis.

Am. Med., Burlington, Vt., 1919—XIV—602.

Berger, A. Information on impacted teeth.

Dental Items Interest, N. Y., 1919—XLI—536, 541.

Billington, W., Parrott, A. H., and Round, H. Bone grafting in gunshot fractures of the jaw.

Proc. Roy. Soc. Med., Lond., 1918-19—XII—Sect. Odontol., 55.

Black, Arthur D. Relation of chronic mouth foci to systemic conditions.

Dental Summary, Toledo, 1919—XXXIX—751.

Blewer, D. A contribution to the study of fusospirillary marginal gingivitis.

Brit. Dent. J., Lond., 1919—XL—749.

Bloodgood, J. C. Scar tissue tumors occurring on the mucous membrane of the lower lip.

Surg., Gyn. and Obstet., Chicago, 1919—XXIX—340.

Bloodgood, J. C. Treatment of tumors of the upper jaw with the cautery: a preliminary report.

Tr. South. Surg. Ass., Phila—1918-19—XXXI—226.

Brose, L. D. Focal disease involving the maxillary antrum, the teeth and the eyes.

Laryngoscope, St. Louis, 1919—XXIX—583.

- Brownlie, W. Barrie.** A case of infection of the lacrimal sacs, maxillary antra, pharynx, tonsils, mouth and parotid glands caused by blastomycis albicans (thrush organism).
J. Laryngol., etc., London, 1919—XXXIV—425.
- Bryant, F.** Cancer of the mouth.
Bost. M. and S. Jour., 1919—CLXXXIII—452.
- Burmeister, C. H.** General anesthetics for intraoral operations.
Dental Summary, Toledo, 1919—XXXIX—935.
- Carter, W. W.** ..Correction of nasal deformities by the implantation of bone; improved technic.
Laryngoscope, St. Louis, 1919—XXIX—476.
- Casparis, H. B.** Cerebral complications in mumps.
Am. J. Dis. Child., Chicago, 1919—XVIII—187.
- Cocker, A. B.** Treatment of acute septic gingivitis (Vincent's disease).
Brit. Dental J., Lond., 1919—XL—663.
- Dameron, E. P.** Infected fractures of the maxillae.
Dental Summary, Toledo, 1919—XXXIX—912.
- Dittman, G. C.** The interrelation between orthodontic malformations and disease of the nose and throat.
Minnesota Med., St. Paul, 1919—II—305.
- Faught, L. A.** The present status of teeth without vital pulps.
Dental Cosmos, Phila., 1919—LXI—626, 628.
- Feldman, M. H.** A consideration of some lesions of the oral cavity from the viewpoint of their relationship to systemic infection, and the technic for administration of conduction anesthesia for their surgical removal.
Dental Cosmos, Phila., 1919—LXI—711, 718.
- Fergus, John F.** Actinomycosis of the parotid gland.
Clinical Jour., Lond., 1919—XLVIII—148.

- Friesell, H. E.** The significance of tooth form in the prevention of oral focal infection.
J. Nat. Dent. Ass., Huntington, Ind., 1919—VI—579, 592.
- Geevin, W. C.** Cleft palate: its development, importance and treatment, and its relation to harelip and its treatment.
Charlotte (N. C.) N. J., 1919—LXXIX—61.
- Gongerot, H.** Posttraumatic epithelioma of the gum and maxillary sinus.
Rev. gen. de clin. et de therap., Par., 1919—XXXIII—178.
- Grieves, C. J.** Ulceromembranous gingivitis: the gingival phase of Vincent's disease.
Dental Cosmos, Phil., 1919—II—156.
- Hartzell, T. B.** A discussion of the factors to be considered in determining whether to extract or conserve diseased teeth.
Internat. J. Orthodontia, St. Louis, 1919—V—341-350.
- Head, J.** Vaccine dosage in the elimination of the systemic effects of mouth infections.
West. M. Times, Denver, 1919-20—XXXIX—20.
- Hennessy, R. V.** A case of peculiar double fracture of the mandible.
J. Austral. Dent., Melbourne, 1919—XXIII—185.
- Kazanjan, V. H.** Prosthetic appliances in surgical treatment of wounds of the face and jaws.
J. Am. M. Ass., Chgo., 1919—LXXIII—1265. Also, Dental Summary, Toledo, 1919—XXXIX—919.
- Kiefer, H. A.** Vincent's angina.
Laryngoscope, St. Louis, 1919—XXIX—150.
- Law, F. M.** Foreign bodies in the face.
Am. Atlas Stereoroentgenol., Troy, N. Y., 1917-18—II—206.

- Leary, A. J.** Relation of oral infection to systemic disease.
Boston M. & S. J., 1919—CLXXXI—611.
- Lederer, W. J., and Riethmueller, R. H.** Oral tumors of dental interest.
J. Dent. Research, Balt., 1919—I—61.
- Marsh, H. S.** Tooth in antrum of Highmore.
M. J. Australia, Sydney, 1919—I—462.
- McGee, R. P.** The maxillofacial surgeon in a mobile hospital.
J. Am. M. Ass., Chicago, 1919—LII—1114. Also,
Dental Summary, Toledo, 1919—XXXIX—834.
- Miner, L. M. S.** The interpretation of radiographs as a basis for oral surgical procedure.
Dental Cosmos, Phila., 1919—XIII—527.
- Mitchell, V. E.** Artificial restoration after the removal of portions of the maxilla or mandible.
Amer. J. Sur., N. Y., 1919—XXXIII—264.
- Moore, Irwin.** Case of long frenum linguae.
Proc. J. Roy. Soc. Med., London, 1918-19—XII. Sect. Laryngol., 108.
- Neu, G. B.** The use of heat and radium in the treatment of cancer of the jaws and cheeks.
Radium, Pittsburgh, 1919-20—XIV—12.
- Ochs.** Leukoplakia lingualis.
J. Cutan. Dis., incl. Syph., Chicago, 1919—XXXVII—482.
- Ochsner, A. J.** Three cases illustrating certain benign lesions of the parotid gland.
Surg. Clin., Chicago, 1919—III—789.
- Olivier, R.** Indirect operative treatment of fistula of parotid gland.
Lyon chir., 1919—XVI—204.
- Peacock, C. N.** The importance of nasal breathing in prevention of dental caries.
Brit. Dent. J., London, 1919—XI—630.

- Potts, H. A.** Oral and plastic surgery in the intermediate section of France.
J. Am. M. Ass., Chicago, 1919—LXXIII—1184.
- Roberts, J. B.** A child with double cleft of lip and palate, protrusion of the intermaxillary portion of the upper jaw and imperfect development of the bones of the four extremities.
Am. Surg., Phila., 1919—LXX—252.
- Shefford, A. D. E.** Some general observations on gunshot injuries of the face and jaws.
Brit. Dental J., London, 1919—XL—541.
- Semple, Sir David, Price-Jones, Cecil and Dight, Miss L.** A report for the pathologic committee of the War Office of an inquiry into gingivitis and Vincent's disease occurring in the army.
Royal Army Med. Corps, Lond., 1919—XXIII—281.
- Shipley, A. M., and Dillon, J. F.** The treatment of maxillo-facial injuries in the zone of the advance.
Am. J. Surg., N. York, 1919—XXXIII—259.
- Skillern, P. G.** A contribution to the surgical pathology of ranula.
Surg., Gynec. and Obstet., Chicago, 1919—XXIX—447.
- Smith, I. E.** The treatment of war injuries of the face and jaws in the base hospitals of France.
Dental Summary, Toledo, 1919—XXXIX—572.
- Stanwell.** Specimen of superior maxilla.
Med. J. S. Africa, Johannesburg, 1919—20—XV—11.
- Stengel, A.** Relation of dental affections to systemic disease.
Dental Cosmos, Phila., 1919—LXI—619-626.
- Syme, W. S.** So-called malignant mixed parotid tumor.
Proc. Soc. Med., London, 1919—XII—108. Sect. Laryngol.
- Tainter, F. J.** Ununited fractures of the mandible treated by bone graft.
Dental Summary, Toledo, 1919—XXXIX—906.

- Waldron, C. W.** Mandibular bone grafts.
Brit. J. Dent. Sc., Lond., 1919—LXII—201.
- Watterson, C.** Lesions of the mouth in congenital and acquired syphilis.
South. M. J., Birmingham, 1919—XII—489.
- Williamson, H. C.** A dentigerous cyst on the upper jaw of a cod.
J. Path. & Bacteriol., Cambridge, 1918—XIX—255.

SECTION 23.—FACE.

- Dufourmentel, L.** Otorhinolaryngology and surgery of face and neck in 1919.
Paris méd., 1919—XXXVI—184.
- Dufourmentel, L.** Reconstruction of the face.
Médecine, Paris, 1919—I—36.
- Gillies, H. D.** Paraffin wax in facial surgery.
Lancet, Lond., 1919—II—174.
- Kazanjian, V. H.** Prosthetic appliances in surgical treatment of wounds of the face and jaws.
J. Am. M. Ass., Chgo., 1919—LXXXIII—1265. Also, Dental Summary, Toledo, 1919—XXXIX—919.
- McGee, R. P.** The maxillofacial surgeon in a mobile hospital.
J. Am. M. Ass., Chicago, 1919—LII—1114. Also, Dental Summary, Toledo, 1919—XXXIX—834.
- Shefford, A. D. E.** Some general observations on gunshot injuries of the face and jaws.
Brit. Dental J., London, 1919—XL—541.
- Shipley, A. M., and Dillon, J. F.** The treatment of maxillofacial injuries in the zone of the advance.
Am. J. Surg., N. York, 1919—XXXIII—259.
- Smith, I. E.** The treatment of war injuries of the face and jaws in the base hospitals of France.
Dental Summary, Toledo, 1919—XXXIX—572.

**SECTION 24.—CERVICAL GLANDS AND DEEPER
NECK STRUCTURES.**

Appelyard, W. A case of phlegmon of neck from a perforation of pharyngeal wall of a swallowed foreign body.

Lancet, Lond., 1919—II—164.

Dufourmentel, L. Otorhinolaryngology and surgery of face and neck in 1919.

Paris méd., 1919—XXXVI—184.

Jones, E. G. Some surgical problems in surgery of the neck.

J. M. Ass., Georgia, Augusta, 1919-20—IX—21.

Rivers, T. M. Hemorrhage into a postscarlatinal cervical abscess; ligation of the common carotid; recovery.

Bull. Johns Hopkins Hosp., Balt., 1919—XXV—33.

Sibbald, D. W. Bezold's mastoiditis without history of aural suppuration.

Brit. M. J., London, 1919—II—441.

SECTION 25.—THYROID AND THYMUS.

Allen, B. M. The relation of the pituitary and thyroid glands in bufo and rana to iodine and metamorphosis.

Biol. Bull. Wood's Hole, Mass., 1919—XXXVI—405.

Allen, B. M. The development of the thyroid glands of bufo and their normal relation to metamorphosis.

J. Morphol., Phila., 1919—XXXII—489.

Barker, W. C. Roentgen ray therapy in hyperthyroidism.

Hahneman. Month., Phila., 1919—LIV—502.

Bear, J. The thyroid: its relation to the female sexual sphere.

Virginia M. Monthly, Richmond, 1919—XLVI—113.

Blackford, J. M. Thyroid intoxication.

Northwest. Med., Seattle, 1919—XVIII—199.

- Blatz, W. E.** A review of the recent literature bearing on the function of the thymus gland.
J. Lab. and Clin. Med., St. Louis, 1919-20—V—50.
- Blondel, R.** Exophthalmic goiter as cause of sterility.
Bull. acad. de méd., Paris, 1919—LXXXII—185.
- Bowling, E. H.** Some studies on the thyroid gland.
Charlotte M. J., 1919—LXXX—148.
- Bowling, W. E.** Function of the thyroid gland.
Am. J. Clin. Med., Chicago, 1920—XXVII—38.
- Boyd, H. J.** An address on goiter.
Brit. M. J., London, 1919—II—169.
- Bull, C.** Enlarged thymus gland in infants.
Am. J. Nursing, Rochester, N. Y., 1919-20—XX—112.
- Christie, C. D.** Basal metabolism in exophthalmic goiter.
Ohio M. J., Columbus, 1919—XV—708.
- Deavor, T. L.** A plea for better cosmetics in goiter work.
Internat. J. Surg., Nov., 1919—XXXII—321.
- De Courcy, J. L.** Local anesthesia in operations upon the thyroid gland.
Am. J. Surg., New York, 1919—XXXIII—245.
- Du Bois, E. F.** The basal metabolism as a guide in the diagnosis and treatment of thyroid disease.
Med. Clin. N. Am., Phila., 1918-19—II—1201.
- Dunhill, T. P.** Some considerations on the operations for exophthalmic goiter.
Brit. J. Surg., Bristol, 1919-20—VII—195.
- Earl, G.** Indications for surgical treatment of the thyroid gland.
Minn. Med., St. Paul, 1919—II—295.
- Foreman, W. H.** Early Basedow's disease.
Indianapolis M. J., 1919—XXII—622.
- Hertzler, A. E.** Prognosis in hyperthyroidism.
Surg. Gynec. and Obstet., Chgo., 1919—XXIX—462.

- Hoskins, E. R., and Hoskins, M. M.** Growth and development of amphibia by thyroidectomy.
J. Exper. Zool., Phila., 1919—XXIX—1.
- Hume, J. B.** Enlargement of thyroid gland in malaria.
British M. J., London, 1919—I—661.
- Johnson, W.** Symptoms of hyperthyroidism observed in exhausted soldiers.
Arch. Diagn., N. Y., 1918—XI—260.
- Kerr, W. J.** A preliminary survey of the thyroid gland among 2182 recruits at Camp Lewis, Washington.
Arch. Int. Med., Chgo., 1919—XXIV—347.
- Koopman, J.** The influence of the thyroid gland in the formation of antibodies.
Endocrinology, Glendale, 1919—III—318.
- Lahey, F. H.** Preliminary ligation in hyperthyroidism.
Bost. M. & S. J., 1919—CLXXXI—618.
- Leiner, J. H.** Intrathoracic goiter.
J. Nerv. and Ment. Diseases, N. Y., 1919—I—449.
- Loeb, L.** Studies on compensatory hypertrophy of the thyroid gland.
J. Med. Research, Bost., 1919-20—XL—199.
- Lueders, C. W.** The use of laboratory methods in the diagnosis of early hyperthyroidism.
Arch. Int. Med., Chgo., 1919—XXIV—432.
- MacLean, N. J.** The surgical treatment of exophthalmic and thyrotoxic goiter with special reference to bilateral resection.
Surg. Gynec. and Obst., 1919—XXIX—475.
- Mann, F. C.** The effect of splenectomy on the thymus.
Endocrinol., Glendale, 1919—III—299.
- Mayo, C. H.** The principles of thyroid surgery.
Med. Press, London, 1919—CVIII—307.
- McNeil, C.** Thyroid hyperplasia.
Edinburgh M. J., 1919—XXIII—189.

- Mills, C. A.** A note on the question of the secretory function of the sympathetic innervation of the thyroid gland.
J. Physiol., Balt., 1919-20—I—174.
- Montoya, J. B.** Exophthalmic goiter in Colombia.
Rev. clin. méd., Colombia, 1919—XIII—1.
- Newton, R. C.** A case of enlarged thymus gland and some remarks on status lymphaticus.
Am. J. M. Sc., Phila., 1919—CLXXXIII—534.
- Park, E. A., and McClure, R. D.** The results of thymus extirpation in the dog with a review of the experimental literature on thymus extirpation.
Am. J. Dis. Child., Chicago, 1919—XVIII—317.
- Plummer, W. A.** The blood picture in exophthalmic goiter.
Minnesota Med., St. Paul, 1919—II—330.
- Porter, M. F.** A summary of the surgical treatment of goiter.
Tr. South. Surg. Ass., Phil., 1918-19—XXXI—160.
- Ransom, F.** Iodides and the thyroid.
Lancet, London, 1919—II—433.
- Richter, H. M.** Thyroidectomy in toxic goiter: a basic fault in the scheme of operation.
J. Am. M. Ass., Chicago, 1919—LXXII—1264.
- Ryan, G.** Medical treatment of goiter.
Med. Rec., N. Y., 1919—XCVI—534.
- Sajons, C. E. de M.** Curative versus symptomatic treatment of exophthalmic goiter.
Med. Rec., N. Y., 1919—XCVI—536.
- Sherrill, J. G.** Operation for thyroid tumor.
Kentucky M. J., Bowling Green, 1919—XVII—323.
- Sloan, H. G.** Note on the recurrence of exophthalmic goiter after thyroidectomy.
Surg., Gyn. and Obstet., Chicago, 1919—XXIX—148.

- Smith, Fred M.** Studies of hyperthyroidism.
J. Am. M. Ass., Chicago, 1919—LXXIII—1828.
- Swingle, G. N.** Iodin and the thyroid. III. The specific action of iodine in accelerating amphibian metamorphosis.
J. Gen. Physiol., Balt., 1918-19—I—593.
- Takenouchi, M.** Studies on the reputed endocrine function of the thymus gland (albino rat).
J. Exper. Zool., Phila., 1919—XXIX—311.
- Tolman, M.** Endemic goiter as a public health problem.
Am. J. Public Health, Concord, N. H., 1919—IX—511.
- Todd, A. T.** Hyperthyroidism in influenza.
Lancet, London, 1919—II—733.
- Tyrrell, Edgar I.** Polycythemia vera (Rubra), complicated with hyperthyroidism.
Brit. M. J., London, 1919—596.
- Uhlenhuth, E.** The function of the thymus gland.
Endocrinol., Glendale, 1919—III—285.
- Watson, L. F.** Quinine and urea injections in goiter.
Pract. Med., Delhi, 1919—XVII—133.
- Weith.** Goiter and iodine in the school.
Cor.-Bl. f. schweiz. Aerzte, Basel, 1919—XXXXIX—1474.
- Williamson, R. T.** The relation of Grave's disease to diabetes and glycosuria.
Lancet, London, 1919—II—425.

SECTION 26.—PITUITARY.

- Allen, B. M.** The relation of the pituitary and thyroid glands in bufo and rana to iodine and metamorphosis.
Biol. Bull. Wood's Hole, Mass., 1919—XXXVI—405.
- Anderson, T. H. R.** Tumor of the pituitary body with acromegaly.
Univ. Durham Coll. Med. Gaz., Newcastle, 1918-19—XIX—48.

- Eustis, A.** Report of a case of hypopituitarism.
N. Orleans M. and S. J., 1919-20—LXXII—261.
- Glassburg, J. A.** Headache and dyspituitarism in the light of therapeusis.
Med. Rec., N. Y., 1919—XCV—461.
- Howe, H. S.** Normal and abnormal variations in the pituitary fossa.
Neurol. Bull., N. Y., 1919—II—233.
- Keeton, R. W., and Becht, F. C.** The relation of hypophysis to glycogenolysis.
Am. J. Physiol., Balt., 1919-20—XLIX—248
- Van Nuys, F.** Case report of hyperpituitarism and hyperglycemia.
Bost. M. & S. J., 1919—CLXXXI—465.
- Weiss, B. P.** Two cases of attacks of somnolence, probably of pituitary origin.
J. Nerv. & Ment. Dis., N. Y., 1919—I—460.

**SECTION 27.—ENDOCRANIAL AFFECTIONS AND
LUMBAR PUNCTURE.**

- Beck, O.** Otitis following diving, sinus thrombosis, island formation of internal jugular.
Monatsch. f. Ohren., etc., 1919—LIII—39.
- Blackwell, H. B.** Perisinus and epidural mastoid abscess subsequent to influenza.
Laryngoscope, St. Louis, 1919—XXIX—587.
- Blumenthal, A.** Determination of bone conduction in gunshot wounds of the head.
Monatschr. f. Ohren., etc., Berlin, 1917—LI—270.
- Fenwick, George.** Surgical treatment of facial paralysis.
British M. J., London, 1919—I—700.

- Fraser, J. S., and Garretson, W. T.** Part I (Continued).
The complications of chronic middle ear suppuration. Indications for, technic and results of the radical and modified radical mastoid operations; details regarding the labyrinthine and intracranial complications of chronic middle ear suppuration.
J. Laryngol., etc., London, 1919—XXXIV—373, 432.
- Gilpin, S. F.** Influenza and intracranial lesions.
J. Nerv. and Ment. Dis., N. Y., 1919—I—353.
- Guttmann, J.** Report of a case of an otitic abscess of the brain.
Laryngoscope, St. Louis, 1919—XXIX—581.
- Jones, J. A.** A case of acute septic meningitis of otitic origin; complete recovery.
Lancet, Lond., 1919—II—59.
- Jones, W. D.** Report of two cases of acute mastoiditis with perisinus and epidural abscess.
Pacific Coast J. Nurs., San Fran., 1919—XV—189.
- Kahn, A.** A brain abscess drain.
Laryngoscope, St. Louis, 1919—XXIX—430.
- Knight, F. H.** Case of perisinus abscess without involvement of the middle ear.
Laryngoscope, St. Louis, 1919—XXIX—433.
- Lake, R.** Particulars of a case of vertigo. Labyrinthotomy, obliteration of the semicircular canals and part of cochlea by bone.
Proc. Roy. Soc. Med., Lond., 1918-19—XII—101.
- Lang, W., and Armour, D.** Ivory exostosis growing from the roof of the frontal sinus into the orbital and cranial cavities, removed through an osteoplastic opening in the cranium by Mr. Donald Armour.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Ophth., 16.
- Lorenson, H.** Some remarks on aphasia.
Am. Med., Burlington, Vt., 1919—XXV—715.

- Mayer, O.** Extradural abscess from cholesteatoma. Spontaneous cure of a case of sinus thrombosis. *Monatsch. f. Ohrenh., Berlin*, 1917—LI—690.
- McNab, J. C. G.** Frontal lobe abscess. *Med. J. S. Africa, Johannesb.*, 1919-20—XV—9.
- Mitain, G., and Schuhmann, E.** Disturbances of speech in cerebellar disease. *Paris méd.*, 1919—XLIII—321.
- Monge, C.** Influenza and lethargic encephalitis at Lima. *Riforma méd., Lima*, 1919—LX—91.
- Nesl, C. T.** Herpes zoster of the glossopharyngeal nerve. *British M. J., London*, 1919—I—630.
- O'Malley, J. F.** Vertigo, labyrinthine or cerebellar. *Proc. Roy. Soc. Med., London*, 1918-19—XII. Sect. Otol., 79.
- Oppenheimer, S.** Cerebellar abscess. *Laryngoscope, St. Louis*, 1919—XXIX—172.
- Oppenheimer, S.** Otitic sinus thrombosis. *Laryngoscope, St. Louis*, 1919—XXIX—172.
- Pollock, H. L.** Nasal and sphenopalatine neurosis. *J. Am. M. Ass., Chicago*, 1919—LXXIII—591.
- Wessels, A. B.** The pathogenesis of pachymeningitis due to nasal operations. With report of cases. *California State J. Med., San Francisco*, 1919—XVII—383.

SECTION 28.—CRANIAL NERVES.

- Adson, A. W.** Cutting the sensory root of the Gasserian ganglion for the relief of trifacial neuralgia. *Surg. Gyn. and Obstet., Chicago*, 1919—XXIX—334.
- Barnhill, J. F.** Surgery of the trifacial nerve. *Laryngoscope, St. Louis*, 1919—XXIX—342.
- Callahan, J. F.** Consensual reaction in the hearing centers. *Laryngoscope, St. Louis*, 1919—XXIX—569.

Gatscher, S. The independence of the nervus cochlearis and vestibularis.

Monatschr. f. Ohrenh., Berl., 1917—II—665, 674.

Heiman. The present knowledge of the function of the eighth pair of cranial nerves.

Monatsch. f. Ohren., etc., Berlin, 1919—LIII—52.

McKenzie, D. The aqueduct of Fallopius and facial paralysis.

J. Laryngol., London, 1919—XXXIV—237.

Neve, C. T. Herpes zoster of glossopharyngeal nerve.

Brit. M. J., London, 1919—II—630.

Ransohof, J. Traumatic facial diplegia.

Am. Surg., Phila., 1919—LXX—159.

Rothenberg, S. Influenzal facial neuritis.

J. Nerv. and Ment. Disease, N. Y., 1919—I—449.

Stickney, O. Report of two cases of abducens paralysis occurring in acute suppurative otitis media with mastoiditis.

Laryngoscope, St. Louis, 1919—XXIX—395.

Wittmaack, K. Pathologic anatomy and pathophysiological points of nonsuppurative disease of the inner ear and of the auditory nerve.

Arch. f. Ohren, Nasen u. Kehlkopf, Leipz., 1916—XCIX—71.

SECTION 29.—PLASTIC SURGERY.

Beck, C. Reconstruction of nose after lupus.

Internat. Clin., Phila., 1919—III—64.

Beck, J. C. Plastic surgery of the head in war and the medical question in Czecho-Slovakia.

Laryngoscope, St. Louis, 1919—XXIX—342.

Carter, W. W. Some observations on the correction of nasal deformities by physiologic methods.

Charlotte M. J., 1919—LXXX—13.

- Dufourmentel, L.** Reconstruction of the face.
Médicine, Paris, 1919—I—36.
- Graef, C.** Rhinoplastic surgery.
N. York M. J., 1919—CX—56, 69.
- Lorek, F.** Rhinoplasty for carcinoma of the nose.
Ann. Surg., Phila., 1919—LXIX—667.
- Mayer, O.** Implantation of periosteum and muscle flaps in antrum fistulae.
Monatsch. f. Ohrenh., Berl., 1917—LI—691.
- Oppenheimer, S.** Cosmetic surgery.
Med. Rec., N. Y., 1919—XCVI—295.
- Potts, H. A.** Oral and plastic surgery in the intermediate section of France.
J. Am. M. Ass., Chicago, 1919—LXXIII—1184.
- Wells, G. S.** Case of leptomeningitis of otitic origin.
California State J. M., San Francisco, 1919—XVII—398.

SECTION 31.—RADIOLOGY.

- Ballenger, H. C.** A study of 100 cases of suspected chronic nasal accessory sinus disease with a report of the X-ray findings.
Ill. Med. J., Chicago, 1919—XXXVI—316.
- Barker, W. C.** Roentgen ray therapy in hyperthyroidism.
Hahneman. Month., Phila., 1919—LIV—502.
- Blaine, E. S.** The X-ray examination of the normal and pathologic esophagus.
Internat. Clin., Phila., 1919—III—144.
- Hays, H. M.** X-ray diagnosis of a case of acute mastoiditis with no mastoid symptoms.
Laryngoscope, St. Louis, 1919—XXIX—660.
- Holmgren, G.** Radium therapy in tubal stenosis.
Laryngoscope, St. Louis, 1919—XXIX—590.

- Merry, G. N.** A roentgenologic method of measuring the potentiality of the voice resonance.
Quart. J. Speech Educ., Menosha, Wis., 1919—XXVI.
- Miner, L. M. S.** The interpretation of radiographs as a basis for oral surgical procedure.
Dental Cosmos, Phila., 1919—XIII—527.
- Neu, G. B.** The value of radium in the treatment of neoplasms of the nose, throat and mouth.
Radium, Pittsburgh, 1919-20—IV—12.
- Neu, G. B.** The use of heat and radium in the treatment of cancer of the jaws and cheeks.
Radium, Pittsburgh, 1919-20—XIV—12.
- Zimmerman, F. W.** The uses of the X-ray in modern dentistry and medicine.
Internat. J. Orthodontia, St. Louis, 1919—V—410-415.

SECTION 32.—SIMULATION.

- Wodak, E.** The use of Barany's apparatus to diagnosticate malingerers by action of the lids.
Monatsch. f. Ohren., etc., Berlin, 1919—LIII—23.

SECTION 34.—EYE.

- Baker, C. H.** Practical points about eye, ear and nose work.
J. Mich. S. M. Soc. Journ., Grand Rapids, 1919—XXVIII—555
- Blondel, R.** Exophthalmic goiter as cause of sterility.
Bull. acad. de méd., Paris, 1919—LXXXII—185.
- Brose, L. D.** Focal disease involving the maxillary antrum, the teeth and the eyes.
Laryngoscope, St. Louis, 1919—XXIX—583.
- Brownlie, W. Barrie.** A case of infection of the lacrimal sacs, maxillary antra, pharynx, tonsils, mouth and parotid glands caused by blastomycis albicans (thrush organism).
J. Laryngol., etc., London, 1919—XXXIV—425.

- Christie, C. D.** Basal metabolism in exophthalmic goiter.
Ohio M. J., Columbus, 1919—XV—708.
- Dunhill, T. P.** Some considerations on the operations for exophthalmic goiter.
Brit. J. Surg., Bristol, 1919-20—VII—195.
- Hansell, H. F.** Ocular affections dependent upon disease of the tonsils.
Tr. Am. Ophth. Soc., Phila., 1918—CLXI—87.
- Lang, W., and Armour, D.** Ivory exostosis growing from the roof of the frontal sinus into the orbital and cranial cavities, removed through an osteoplastic opening in the cranium by Mr. Donald Armour.
Proc. Roy. Soc. Med., London, 1918-19—XII. Sect. Ophth., 16.
- MacLean, N. J.** The surgical treatment of exophthalmic and thyrotoxic goiter with special reference to bilateral resection.
Surg. Gynec. and Obst., 1919—XXIX—475.
- Montoya, J. B.** Exophthalmic goiter in Colombia.
Rev. clin. méd., Colombia, 1919—XIII—1.
- Oetteking, B.** The processus frontosphenoidalis of the zygoma and its bearing on the configuration of the orbit.
Anat. Record, Phil., 1919—XVII—25.
- Onate, A. Frias.** Eye sign in mastoiditis.
Vida nueva, Havana, 1919—XI—172.
- Plummer, W. A.** The blood picture in exophthalmic goiter.
Minnesota Med., St. Paul, 1919—II—330.
- Scott, G. D.** Adenoids, chronic conjunctivitis, photophobia case and a cure.
N. York State J. Med., 1919—XIX—374.
- Sloan, H. G.** Note on the recurrence of exophthalmic goiter after thyroidectomy.
Surg., Gyn. and Obstet., Chicago, 1919—XXIX—148.

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